

Insight Report

Bridging the Skills and Innovation Gap to Boost Productivity in Latin America

The Competitiveness Lab: A World Economic Forum Initiative

Prepared in Collaboration with Deloitte

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Preface



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Discussions at the World Economic Forum's Annual Meeting at Davos and other fora among leaders from public and private sectors as well as civil society have indicated participants' keen interest in deepening their understanding and engaging in an informed multi-stakeholder dialogue on effective ways to boost competitiveness. In response to this growing interest, the World Economic Forum launched the Competitiveness Lab initiative in 2013, with the objective of organizing an informed multi-stakeholder process to inform and advance the competitiveness agenda of a country or region. The Competitiveness Lab - Latin America focuses on two specific and interrelated competitiveness challenges at the regional level, namely the skills and innovation gap.

Competitiveness is a key driver for sustaining prosperity and raising the well-being of the citizens of a country. The relevance and applicability of the Competitiveness Lab initiative, therefore, extends beyond the Latin American region and this report. This report is the output of our first regional Competitiveness Lab focused on Latin America. It offers ten recommendations elaborated by the Steering Board of the initiative, suggesting collaborative approaches to begin bridging the identified gaps. It also provides an overview of the current state of skills development and innovation capability in the region, a root-cause analysis for the existing challenges, and selected examples of initiatives that are helping to successfully tackle such challenges.

We hope that this report will provide Latin American leaders a useful tool with which to boost Latin America's competitiveness and inspire a strategic dialogue among stakeholders across sectors and national boundaries. Collaboration among policy-makers, businesses, and civil society leaders, as well as cooperation at a regional level, are crucial elements of successfully addressing the region's productivity challenge, and we recognize the members of the Competitiveness Lab - Latin America Steering Board for their contributions to this report.

We wish to thank the authors of the Competitiveness Lab report from the World Economic Forum's Competitiveness and Benchmarking and Latin America teams, as well as Deloitte for their support. Finally, we would like to convey our gratitude to our network of Partner Institutes worldwide, and particularly in Latin America, without whose valuable input this report would not have been possible.

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1. Executive Summary

Latin American leaders face a challenge and an opportunity to boost competitiveness by addressing the region's productivity lag. Supporting a transition towards higher productivity levels – which requires improving the functioning of its institutions; the quality of infrastructure; the allocation of production factors; and, crucially, strengthening the region's skills, technology and innovation base – will be key to the region's well-being and prosperity. This report analyses the current situation and challenges in Latin America's skills and innovation landscape and recommends ways to address these challenges. This effort is the first output of the Competitiveness Lab initiative, which will continue to focus on key competitiveness issues and challenges of global relevance and applicability in other regions and/or countries. The Competitiveness Lab seeks to achieve this by designing competitiveness strategies, defining policies in specific areas of competitiveness and facilitating public-private collaborations.

1.1 Context and Objective

After a period of robust global economic growth and a commodity boom that benefited several Latin American countries, the region's growth halted in the Great Recession of 2008-2009, and projections paint a sluggish near-term future for the region and the global economy. There are great variations in the region in countries' social and economic strengths and weaknesses, but they all share a persistent productivity lag compared to advanced and emerging economies, especially those in Asia. While a complex ecosystem of policies, institutions and factors affects the region's productivity and competitiveness (as illustrated, for example, by the 12 pillars of competitiveness in the Global Competitiveness Index), consistent and shared challenges in the region have been observed in the inter-related areas of skills and innovation.

The objective of the Competitiveness Lab – Latin America and this report, therefore, is to support the design, launch and implementation of actionable agendas for public-private collaborations to increase competitiveness by addressing the region's common challenges in skills and innovation. This objective was made possible by engaging the World Economic Forum's multistakeholder communities to identify the region's leaders and experts in competitiveness, skills and innovation, who served as members of the Competitiveness Lab Steering Board. The Competitiveness Lab – Latin America's long-term objective is to deepen and broaden this engagement with the region's leaders to broker private-public collaborations and intra-regional cooperation, encourage better decision-making and support transformation processes.

1.2 Structure of this Report

The members of the Competitiveness Lab Steering Board developed a set of 10 recommendations to help the region's leaders begin bridging the identified gaps in skills and innovation. These recommendations are presented in Section 2 of this report.

Section 3, available in the online edition of this report, represents the full analysis of Latin America's current state and challenges in competitiveness, skills, and innovation, based on a series of discussions between the member of the World Economic forum and the Competitiveness Lab Steering Board, as well as a review of the existing literature and research on these topics.

1.3 Summary of the Current State and Root Cause Analysis

Background and context

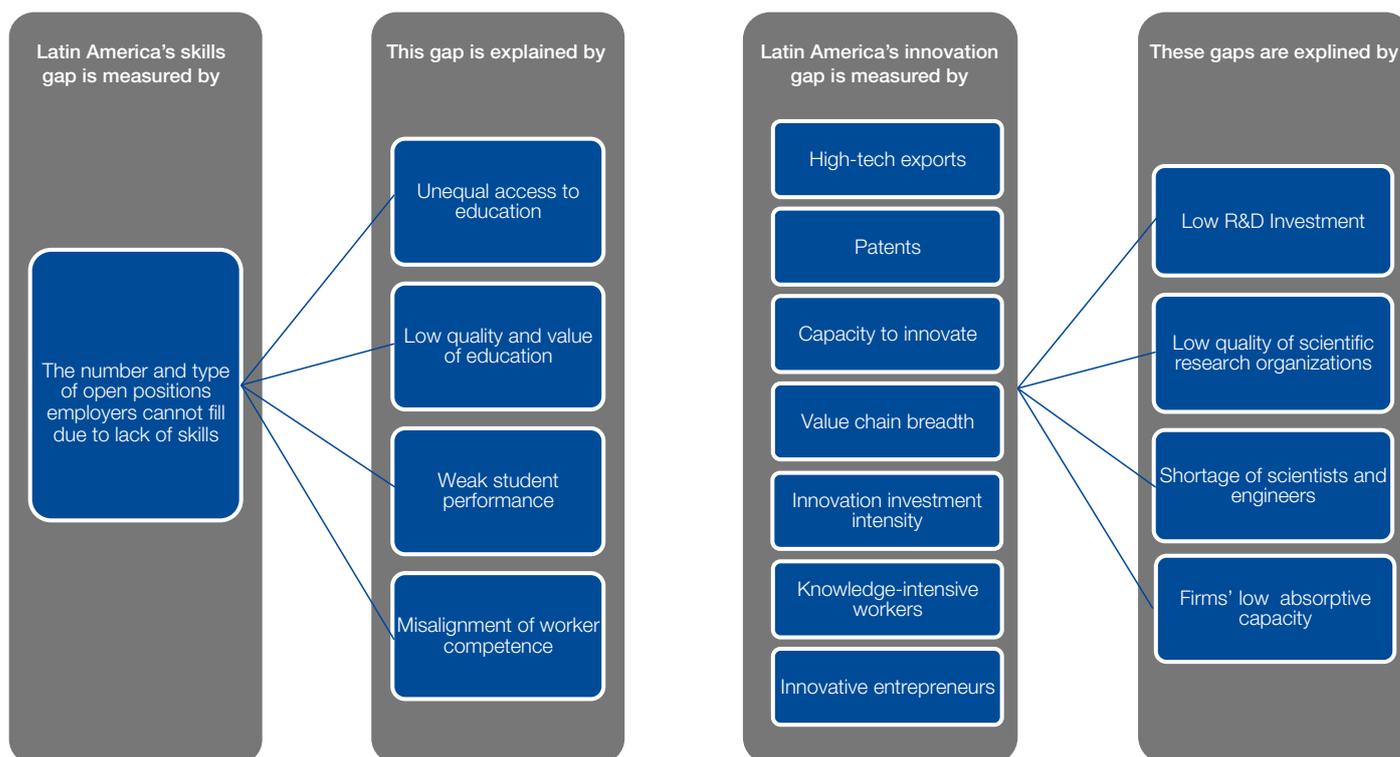
This section sets the stage by providing an overview of Latin America's macroeconomic conditions of slowing growth, dependence on commodity prices and lagging productivity. This context highlights the urgency for the region to overcome its productivity challenges and build economic resilience to sustain and enhance competitiveness in an environment of slower global economic growth.

Current state of skills and innovation gaps and underlying factors

This section assesses the current state of Latin America's skills and innovation challenges in a structured analysis of the relevant performance indicators from existing literature, distinguishing between indicators that measure the actual state of the skills and innovation gaps and those that measure the underlying conditions or determinants, as illustrated in the figure below.



To access our full analysis, please visit
<http://wef.ch/latamcompetitiveness>



The current skills gap is measured by the number of vacancies that firms cannot fill and the type of skills that employers need but have the most difficulty finding, which highlights the magnitude of the skills mismatch. Indicators that explain this mismatch are the region's unequal access to education, a perception of low quality and value of the education and training systems, misalignment between education providers and employers on how workers should be trained, and weak performance on international student tests.

The current state of innovation is measured by the output of innovative activities (e.g. high-tech exports, patents) and innovative capabilities at the firm level (e.g. capacity to innovate, innovation investment intensity and value chain breadth), as well as at the individual level, measured by the number of knowledge-intensive workers and opportunity-driven entrepreneurs. Indicators that explain the lagging performance in innovation include low levels of research and development (R&D) and innovation investment, particularly from the private sector, and a shortage of scientists and engineers, the low quality of scientific research institutions and firms' low absorptive capacity (the ability to adopt and use new technologies).

An important consideration in this analysis is the complementarity of the skills and innovation challenges and their negative impact on productivity and competitiveness: the region's lack of skilled workers negatively impacts virtually all indicators of innovation including the quality and number of workers who are capable of generating innovation, which in turn limits firms' absorptive capacity. Low levels of innovative activities, in turn, suppress the economy's demand for highly skilled workers, creating a vicious cycle of low

productivity that continues to plague the region and limits its competitiveness potential, highlighting the importance of jointly addressing the challenges in skills and innovation.

Root causes of skills and innovation gaps

This section begins with acknowledging that Latin America's skill and innovation gaps share a largely common set of root causes, including the region's absence of strong framework conditions, insufficient and inefficient investment, a lack of coordination among key players, as well as production structure-driven conditions that are simultaneously the causes and the consequences of the region's low productivity. All of these factors are influenced and shaped by the region's cultural and institutional beliefs and practices, which should be considered as part of any long-term strategy that addresses the region's productivity challenges.

Overcoming skills and innovation gaps: examples

This section highlights selected examples from countries and organizations, both within and outside of Latin America, that have begun to address their skills and innovation challenges through effective use of public-private collaborations, which we believe are fundamental to addressing the key root causes and bringing about measurable change. Public-private collaborations can increase the impact and efficiency of investments, generate positive spillovers, and have the potential to positively influence the region's structural limitations, such as the framework conditions and production-driven weaknesses. These examples demonstrate that a strategic execution of public-private collaborations with a clear vision, strategy and evaluation system can be used to boost Latin America's productivity and raise its overall competitiveness.

	Description
USA's Change the Equation coalition	A US Government-initiated public-private collaboration with 100+ CEOs to advocate better policies and strengthen the impact of corporate philanthropy to improve science, technology, engineering and mathematics learning in the United States.
Regional Fund for Digital Innovation in Latin America and the Caribbean	An initiative of the Regional Registry for Internet Addresses for Latin America and the Caribbean, which is dedicated to developing the region's information society by funding research projects and recognizing and rewarding innovative approaches in the use of information and communications technology for development.
Brazil's strategic development of local production clusters	Brazil's policy for local production clusters promotes the development and implementation of a coordinated strategy in a region's economic, political and social agents that engage in specific production activities. Cluster-based development strengthens production linkages and improves firm-to-firm coordination by allowing stakeholders to deploy resources strategically and engaging industry leaders in a regional strategy.
Finland's Vigo Venture Accelerator Programme	Government programme to coach start-ups to quickly enter the global market with the help of successful serial entrepreneurs. Its objective is to create a market for start-ups and experienced business people and incentivize them find each other.
Netherlands' Leading Technology Institutes	Leading Technology Institutes partnerships were launched in 1997 to bring together public research organizations (e.g. universities, national research centres) and industrial partners. Their primary mission is to perform strategic research on increasing the innovative power and competitive strength of Dutch industry.
Switzerland's Vocational Education and Training reform	Prepares 30,000 young people to enter the job market each year in trade and commerce-related occupations. Companies initiated reform of this basic commercial training to better align the programme to their needs.
Latin America's Pacific Alliance Scholarship Programme	Launched in 2012 to provide Chile, Colombia, Mexico and Peru with 100 scholarships each per year for academic exchanges for undergraduate and doctoral students and teaching internships.
Brazil's Science without Borders	A nationwide scholarship programme funded by the Brazilian federal government that seeks to strengthen and expand the initiatives of science and technology, innovation and competitiveness through the international mobility of undergraduate and graduate students and researchers.

1.4 Summary of the Recommendations

The Competitiveness Lab – Latin America's recommendations are presented not as a discrete set of tasks to be selectively implemented, but as a systemic and interconnected framework of actions, strategies and principles that highlights the importance of establishing a sound economic and social

foundation; enhancing both the efficiency and sufficiency of investments; and utilizing public-private collaborations and intra-regional cooperation to maximize the benefits of policies and programmes that rely on the support, knowledge, and resources of multiple sectors and regional entities.

Framework and summary of recommendations

The framework illustrates the interconnections among priority areas, which are supported by specific recommendation(s).

Priority	Recommendation
 Strengthen framework conditions	1. Maintain focus on policies that establish the fundamentals of a well-functioning economy
 Enhance efficiency of investment	2. Enhance policy effectiveness by assessing current policies, establishing evaluation criteria, and monitoring and managing capacity
	3. Align investments to champion economic and social priorities
 Increase the level of investment	4. Increase private investment in skills and innovation development
 Build stronger public-private collaborations	5. Create a standardized catalogue of research competencies
	6. Design public-private research and skills development funding schemes
	7. Define and implement cross-sectorial vocational education and training programmes
 Foster intra-regional cooperation	8. Establish a regional multi-annual research and innovation fund
	9. Enable a freer flow and exchange of students and researchers in the region
 Employ a flexible implementation approach	10. Start small and opt in

2. Recommendations to Bridge Latin America's Skills and Innovation Gap

2.1 Introduction

The Competitiveness Lab began with an acknowledgement of Latin America's productivity challenge, and of the region's shortcomings in the areas of skills and innovation as two of the most prevalent factors preventing the region from reaching its full competitiveness potential. Based on an analysis of current

literature and insights from region's academics, policy-makers, civil society and business leaders, the Competitiveness Lab has developed a set of recommendations, intended to serve as a guide for Latin America's leaders whose objective is to boost the region's competitiveness by strengthening its skills and innovation base.

Exhibit: A Framework for Recommendations to Close the Skills and Innovation Gaps in Latin America



Recommendations approach

Given the diversity of economic, social, and political history and current state in Latin America, virtually all elements of the recommendations already exist in the region with varying degrees of maturity and results. These recommendations, therefore, are intended not as a sequential checklist of discrete tasks, but as an interdependent and connected system of priorities and principles to enhance and strengthen the skills and innovation landscape in Latin America.

About the framework

The following ten recommendations address both the content (what) and processes (how) that should be put in place to achieve meaningful results, and are expected to deliver four inter-related desired outcomes (exhibit): 1) more efficient investment; 2) higher overall investment; 3) stronger public-private collaborations and 4) increased intra-regional collaboration.

The recommendations in this report, as illustrated in the exhibit, go beyond the four desired outcomes to present a systemic and collaborative approach towards enhancing the region's productivity. First, achieving measurable success in any of these four areas requires a sound economic and social foundation, defined in this document as the economy's framework conditions. The definition and prioritization of these conditions may vary by country, but this report defines framework conditions as the adequate provision of public goods, strong macroeconomic conditions, market efficiency and infrastructure. Second, the tenth recommendation

emphasizes not a specific action but a principle that should be applied to all regional efforts to enhance skills and innovation, to employ a flexible implementation approach that uses small pilot-based programmes and an opt-in strategy. These tools provide an adaptive style of implementation to help swiftly identify and resolve unforeseen errors and bottlenecks, and to clearly demonstrate the benefits and scalability of successes. Third, the four areas of recommendation are not meant to be a sequential checklist of tasks, but an interdependent, connected set of priorities, strategies and actions that strengthen and complement one another. For instance, improving the efficiency of investment will make increasing the overall level of investment more valuable. In addition, any efforts to make investments in skills and innovation more efficient will be most successful when they engage stakeholders from all relevant sectors to collaborate on a shared objective.

2.2 Strengthen Framework Conditions

No policy, instrument or collaboration can achieve the full extent of its desired outcomes if the region's framework conditions do not provide a strong foundation for their execution and continued operations. Implementing these recommendations, however, does not begin only after achieving strong framework conditions. The first recommendation is to strengthen framework conditions to 1) ensure that all skills and innovation improvement efforts take into account the larger economic and social context and 2) encourage a continued and strategic conversation between those who are responsible for the region's framework conditions and those who are responsible for closing its skills and innovation gaps. Institutional awareness and dialogue in this context will help policy-makers establish and calibrate an optimal path for intervention.

Recommendation 1: Maintain focus on policies that establish the fundamentals of a well-functioning economy

Increasing the region's skills and innovation capacity requires not only improvements to policies focusing specifically on skills and innovation development, but to policies that improve the region's overall business conditions. Particular focus should be placed on implementing policies that strengthen 1) the intensity of local competition; 2) the regulatory and legal environment, supported by strong and effective watchdog organizations; 3) the availability of capital and 4) the availability and adoption of key infrastructure, particularly in information and communications technology (ICT).

Policies that improve market efficiencies and steer the economy towards higher-productivity activities will help remove the bottlenecks preventing the region from realizing its full productivity potential. An example of such a bottleneck is the prevalence of microenterprises and small to medium-sized enterprises (SMEs) with low-skilled workers and limited innovative capabilities. Policy-makers can help, for example, by investing strategically in key infrastructure and establishing incentives for higher value-added and innovation-oriented production activities in the region's microenterprises and SMEs.

2.3 Enhance the Efficiency of Investment

Enhancing policy effectiveness in skills and innovation development requires a two-pronged approach. First, each policy should be evaluated for its effectiveness and aligned with existing policies and institutional capacity to ensure the maximum return on investment. Second, the region must continue to focus on increasing the overall level of investment, which remains low, particularly from the private sector.

Recommendation 2: Enhance policy effectiveness

2a. Conduct an assessment of the region's current skills and innovation policies: Current skills and innovation-oriented policies and instruments should be assessed in each participating country. A structured assessment, similar to that used in the World Economic Forum's Competitiveness Repository programme, is recommended.¹ Information collected, at a high level, should include the policy or instrument's objectives, past and current resources, principal agents and their roles, and its impact to identify the policy/instrument rationale, results to date, and any potential design and/or implementation gaps.

2b. Establish rigorous ex ante and ex post evaluation processes for new policy and instrument design and implementation: Using the assessment results from Recommendation 2a, each new policy related to skills and/or innovation should be required to identify and provide a rationale for intervention by 1) defining the market failure that the policy is addressing (which is not addressed by current policies); 2) identifying the specific instruments and tools designed to tackle the identified market failure and 3) allocating the institutional capacity to properly implement, monitor and evaluate the results of the intervention. Any new policy undergoing this process should be evaluated in a multistakeholder consultative process, guided by strong analytical criteria and processes to ensure ongoing engagement from all major stakeholders.

2c. Enhance institutional capacity for effective policy and instrument implementation, management and monitoring: Introducing a new level of rigor in policy design is a good start, but it is insufficient to guarantee it will remain a worthwhile investment. This is particularly true in areas of innovation, where emerging technologies and global knowledge advance at an unprecedented rate. Continuous management and monitoring of the policies to ensure their relevance and impact are crucial, but such oversight requires a strong technical and managerial skill set that many countries in the region may lack. One potential solution to this challenge may be to allocate a percentage of the proposed grant (e.g. 1%) to train the officials responsible for administering it.

Recommendation 3: Align investments to champion economic and social priorities

A discussion of investment efficiency in this context must ask not only "is the investment yielding returns greater than its cost?" but also "is the investment allocated to meet the most critical needs of society?" Leaders responsible for allocating

investments to improve skills and innovation, therefore, must not only ensure the positive yield of investments and their institutional capacity to manage them, but also be able to rationalize the championing of selected value chains, based on the criticality of the need and the anticipated benefits of each target.

In cases where a clear market failure exists and access to financing remains restricted for a particular type of value chains, industries, or localities, government-led financing instruments, such as research and skills development grants, tax credits or guarantee schemes should be developed, paying special attention to their design and full implementation to ensure they reach their targeted audience. One example is to develop a programme in which localities compete for the national government support; these schemes may be useful to promote an efficient use of the resources, and greater ownership of initiatives at the local level. Equally important as identifying critical needs is identifying and mapping a clear exit mechanism for the investment. Once the market failure has been addressed and the outcomes realized, stakeholders of the investment must evaluate and provide a rationale for continuance or termination. Recommendations 2b and 2c, which emphasize multistakeholder engagement, are critical components of implementing a successful exit mechanism.

2.4 Increase the Level of Investment

While Recommendations 2 and 3 propose ways to enhance the efficiency of investments through effective policy design and implementation as well as strategic targeting of investments, equally crucial for the region's competitiveness is ensuring that there is a sufficient level of investment for new and existing skills and innovation policies and instruments. Private sources of funding, in particular, must be encouraged to support innovation research and entrepreneurialism in the region.

Recommendation 4: Increase private investment in skills and innovation development

The lack of adequate and timely access to finance impedes skills and innovation development in Latin America. This bottleneck can be eased by encouraging private investment, for example by introducing venture capital to collaboration (cluster) programmes, helping innovative SMEs seek funds, and offering tax incentives for funds invested in innovation or skills development projects in defined areas.² Stakeholders responsible for implementing these financial instruments should identify market failures in the financing of innovation at different stages, and apply the chosen vehicle(s) to foster actions with the highest innovation potential.

Relatively new financing instruments popular in advanced economies, such as corporate venturing (e.g. Google Ventures), may be used as an effective mechanism for companies seeking to renew their product offering by creating new markets or launching new innovations.³ Governments can also use new alternative financing vehicles to effectively collaborate with private investors to boost investment in skills and innovation development. Examples of such tools include

social impact bonds, in which government agrees to pay for improved social outcomes that result in public sector savings, and sovereign/agency wealth funds, which are owned by government agency but are managed independently and aim to fund a specific need.⁴

2.5 Build Stronger Public-Private Collaborations

The primary objective of these recommendations is to increase the level of trust between public and private sectors, which has been a persistent challenge in Latin America. They focus on a particularly weak link: the quality and strength of the academia-industry relationship, which has crucial implications for both the skills and innovation development in the region. A renewed effort by all stakeholders to create effective collaborations would signal an opportunity to redefine and reinvigorate this relationship, with the shared goal of rebuilding the governance and incentive structures of education and research institutions to be more responsive to (and better aligned with) the region's business needs.

Recommendation 5: Create a standardized catalogue of research competencies

A standardized catalogue of the region's public research institutions and their competencies will inform the private sector of the public sector's current capabilities and priorities, and in turn reveal any gaps between the competencies businesses need and what the research institutions are producing. Research competencies should also include relevant data and analysis such as the institution's budget, number of projects, economic sectors targeted and probable impact. This recommendation has two main desired benefits. First, a structured dialogue between research institutions and businesses based on this catalogue of competencies will help strengthen the research-industry linkage and relevance by identifying and addressing existing gaps. Second, this effort could first focus on a specific field of study of high strategic importance to a subset of countries in the region (i.e. computer science), and then be scaled up to foster knowledge flows between the region's research institutions and productive sectors.

Recommendation 6: Design public-private research and skills development funding schemes

Establishment of a research competency catalogue sets the stage for participating research institutions and relevant industrial partners to target specific industries and competencies for further research and potential commercial application, identified jointly between the public and private sectors. Successful implementation of such funding schemes, for example Austria's KPlus Competence Centre Programme, should administer multi-year funding to recipients composed of qualified research institutions and more than one industrial partners with a common need. To qualify, each recipient group must demonstrate the ability to cluster scientific and economic competence to meet the identified need(s), and the proposed work must demonstrate a potential to bring an economic benefit to the private sector.⁵



Recommendation 7: Define and implement cross-sectorial vocational education and training programmes

A structured dialogue between academia and business, as advocated in Recommendation 5, also provides a platform for enhancing the quality and relevance of the region's vocational education and training programmes. As Latin American employers report some of the world's largest gaps in the skills they need versus the skills new hires have, well-designed vocational education and training programmes can serve as an important instrument to begin closing this gap. Research has indicated that Latin American student performance in vocational schools tends to be above that of general education, suggesting vocational students are motivated by the close linkage between performance and employment prospects.⁶

The design and implementation of vocational education and training programmes must have input from both the business sector, organized around clusters of firms with a defined need for focused training (e.g. firms with skill-intensive productive processes such as automotive and machinery), and the region's public and private education providers. While the education sector provides the necessary infrastructure and programme management, businesses should be engaged in developing the academic curricula at all levels, as well as the administration of hands-on training.⁷

2.6 Foster Intra-regional Cooperation

Expanding and facilitating the knowledge and talent flows within the region, while also remaining open to the rest of the world, is a crucial element in closing the region's skills and innovation gap. The long-term objective of the following set of recommendations is to improve the intra-regional integration of productive chains (and facilitate knowledge flows within these chains), with the assumption that these efforts will more efficiently allocate talent and resources by broadening the market in which they can be deployed.

Recommendation 8: Establish a regional multi-annual research and innovation fund

A regional fund to foster research and innovation should be established, led by participating governments and in cooperation with multilateral agencies and the private sector. Existing regional funds, such as Horizon 2020 (formerly known as the Research Framework Programme) in the European Research Area and Regional Fund for Digital Innovation in Latin America and the Caribbean (FRIDA) regional fund in Latin America,⁸ are good benchmarks for the design and implementation of such a fund. The FRIDA programme also provides the important benefit of recognizing and celebrating excellence in innovation, particularly by the region's emerging entrepreneurs, which helps counter some of the cultural bias against entrepreneurialism that may persist in some countries in the region.

The primary value proposition of such a regional fund is that it can accelerate the delivery and dissemination of research and innovation across the region, enabling participants to more quickly and fully realize the benefits of breakthrough findings. Its regional scope would broaden the pool of talent and resources throughout the productive chain and allow for the faster commercialization and use of research findings. The fund's governance and operational model should leverage other examples with a regional scale, such as the European Union's European Innovation Partnerships.⁹

Recommendation 9: Enable a freer flow and exchange of students and researchers in the region

The flow of knowledge and talent within the region can be increased in two main ways. One is to create a Latin American student exchange programme, similar to the Erasmus Programme in Europe, which requires a standardized process of recognition and alignment of academic accreditation. This effort aligns with Recommendation 5, which calls for creating a standardized catalogue of research competencies.

A second method is to develop a Latin America researcher mobility programme, similar to efforts already being made by the member countries of the Pacific Alliance and Brazil's Science without Borders initiative.¹⁰ The programme could begin within the region, similar to the efforts of the Pacific Alliance, but could be scaled up to attract top talent from outside the region and to send the region's top talent to the world's leading academic and research institutions, as demonstrated by Brazil's Science without Borders Programme. A key criterion for implementing this recommendation is a country's framework conditions, which should be mature enough to ensure that participants can find a suitable position upon their return. This will prevent a potential sub-regional disparity between talent investment and utilization.

2.7 Employ a Flexible Implementation Approach

The "how" of implementation is just as crucial as, if not more than, the "what" of implementation. Whether the recommended changes aim to enhance policy effectiveness or foster public-private and/or intraregional collaborations, all implementation efforts must sustain continuity through the inevitable political and economic disruptions, yet remain agile enough to adapt to changing conditions when necessary. The following approach, therefore, should be applied to all implementation efforts in improving the skills and innovation in Latin America.

Recommendation 10: Start small and opt in

Many of the recommendations require the extensive and complex alignment of objectives and specificities across multiple stakeholders (e.g. competency identification and cataloguing, regional mobility programmes). To quickly demonstrate the benefits of such efforts and to provide an incentive for further development, implementation efforts should begin with a series of small pilot programmes to identify implementation bottlenecks (and their corresponding

solutions) before expanding the recommendations across other sectors and/or countries.

Adopting an "opt-in" strategy for intra-regional cooperation efforts also enables countries with adequate institutional capacity to participate and scale up quickly, while allowing the programmes to respond to fluctuations in membership. As discussed in Recommendation 2 about effective policy implementation, a structured governance process should be developed with participation from all sectors and countries to assess the impact of all major political, economic and social changes to the intended outcomes of the programme, allowing for the timely calibration of its goals, success factors and timelines as necessary.

2.8 Conclusion

These 10 recommendations outline a systemic and collaborative approach to bridging the skills and innovation gaps in Latin America. The first recommendation emphasizes the importance of strong economic foundations, which vary by country but emphasize some of the common fundamentals such as intensity of competition, a regulatory environment conducive to developing talent and innovation, the availability of capital, and a sound infrastructure. Recommendations 2 through 4 focus on increasing both the efficiency and the sufficiency of investment, through effective policy design and implementation, strategic prioritization of investment, and exploring programmes and financing vehicles to boost private investment in skills and innovations development. Recommendations 5 through 7 aim to encourage strategic collaborations between academia and industry, by creating a research competency catalogue and a funding scheme to explore competencies that have the highest potential for commercial application and socio-economic benefit, and a cross-sectorial vocational training programme to begin addressing the mismatch between education and employment. Recommendations 8 and 9 propose programmes to support a freer flow of talent and knowledge within the region, to improve the efficiency of investment in skills development. Recommendation 10, intended as a process principle to be applied to all other recommendations in this document, urges flexibility and scalability through the use of small pilots and an opt-in strategy. The objective of these recommendations is to spur a series of dialogues and commitments to begin tapping the region's enormous competitive potential.

3. Annex: Current State and Root Cause Analysis of Latin America's Skills and Innovation Gap

3.1 Background and Context

Introduction

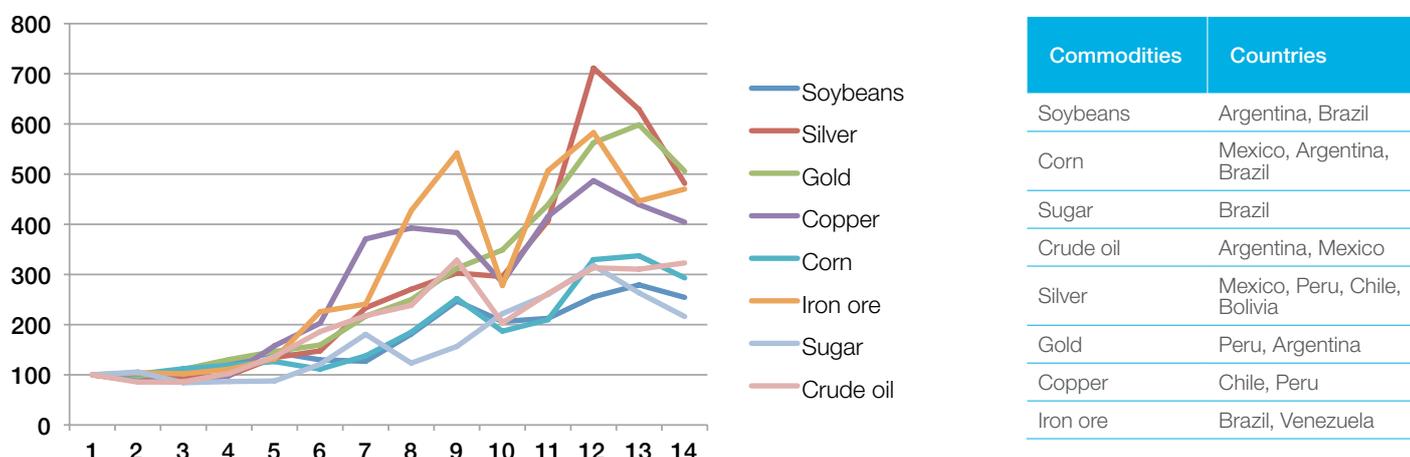
Latin America has enjoyed robust economic growth in recent years, thanks to a boom in commodities prices, favourable international macroeconomic conditions and a rise in domestic consumption. Latin America continues to suffer from a relatively low level of productivity, however, which negatively impacts its competitiveness and raises questions about the region's ability to sustain the recent economic and social progress. Many factors explain this productivity challenge, but skills and innovation stand out as two of the most significant variables: workers are either insufficiently trained, or not trained in the types of skills that Latin American economies now need, which include technical skills as well as "soft" or "socio-emotional skills" such as critical thinking, teamwork, communications and problem solving. In addition to persistently low levels of R&D investment, Latin America also lags behind in its capacity to innovate, due to limitations in its framework conditions, investments and production structure. This section provides an overview of Latin America's macroeconomic conditions, highlighting the urgency for the region to overcome its productivity challenge and build economic resilience as the global market enters a period of slower growth.

Overview of macroeconomic conditions

Between 2003 and 2012, Latin American economies grew at an average annual rate of 4.0%, even after accounting for the contraction caused by the Great Recession of 2008-2009.¹¹ From 2003 to 2008, the region's top-performing economies – Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela – witnessed a growth of 6.6% annually, significantly outperforming the regional 20-year average growth (1992-2012) of 3.7%.¹² This expansion was fuelled by growth in world trade, increased flows of capital to the region and a rapid rise in commodity prices.

During the last decade, Latin America has enjoyed an unprecedented boost in trade from a great commodity boom, driven by demand from emerging markets, particularly China. The surge in commodity prices led to growth in many Latin American countries including Brazil, Chile, Peru, Argentina and Mexico, which are among the world's largest producers and exporters of commodities. Figure 1 illustrates the relative price changes in major commodity exports from Latin America, demonstrating the dramatic rise in prices from 2000-2008, a sharp but temporary decline during the Great Recession, followed by a recovery through 2012. Commodity prices, however, started to decline again in 2013, adversely affecting the region's growth.¹³

Figure 1: Commodities Price Percentage Changes: 2000-2013

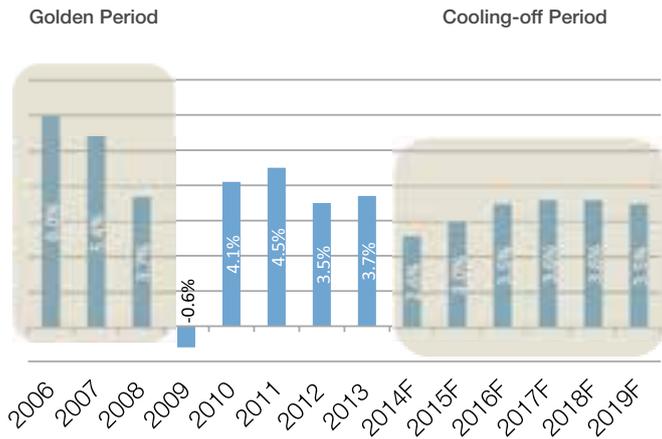


Source: World Bank Commodity Data, authors' calculations

Latin America's vulnerability in a global slowdown

Latin America's growth began to slow in 2012 in step with the decelerating global economy, as advanced economies enacted stricter monetary measures to recover from the Great Recession of 2008-2009. The International Monetary Fund (IMF) forecasts an average growth rate of no more than 3.9% a year globally over the next five years, in line with Latin America's average projected growth rate of 3.3% for 2014-2018 (Figure 2).

Figure 2: Latin American Real GDP Growth (%) 2006-2013, and Projected Growth (%) 2014-2019



Note: Calculations include the 26 countries in Latin America and the Caribbean: Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay and Venezuela.
Source: IMF World Economic Outlook, October 2014

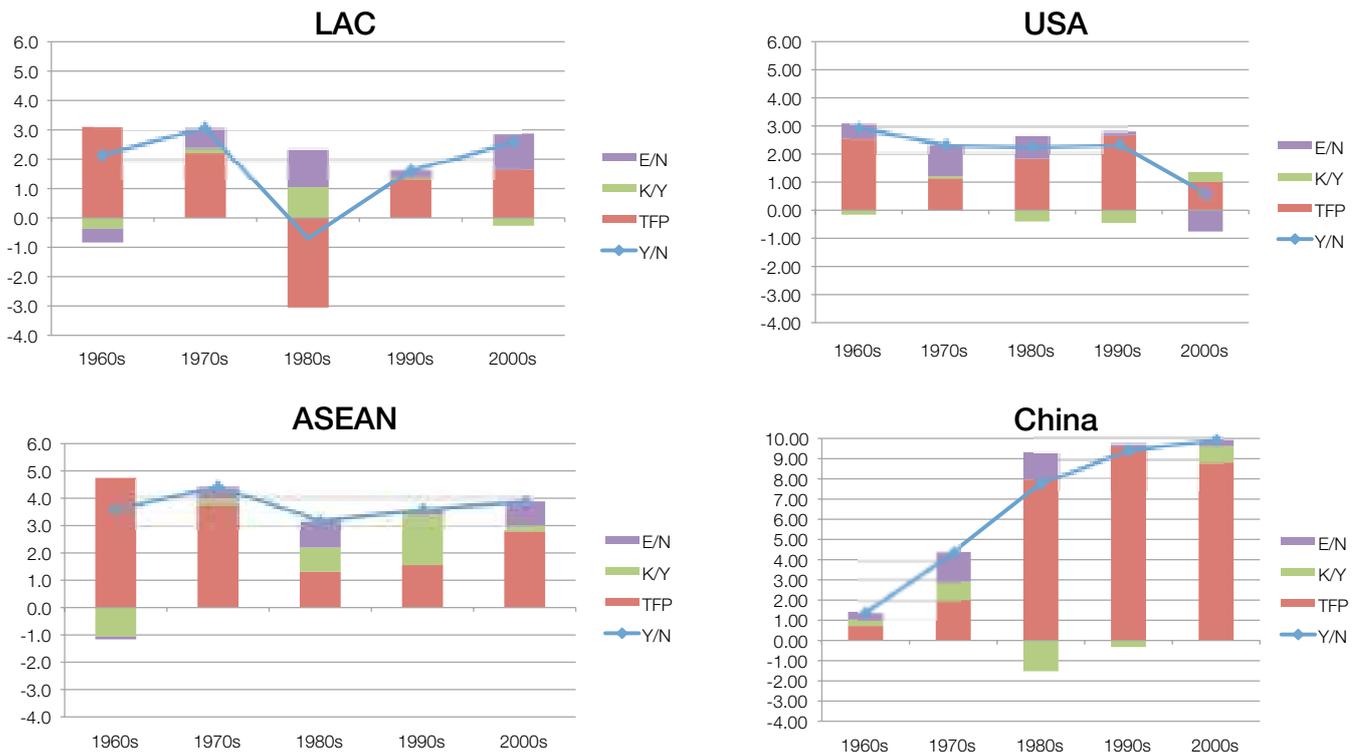
These projections have raised the urgency for Latin America to reduce its dependence on commodities, and to boost its productivity and competitiveness. The region continues to suffer from strong headwinds related to weak investments, a fall in exports and commodity prices, and tighter access to finance that, to a large extent, fuelled growth in recent years.¹⁴

Latin America's productivity challenge

Latin America's productivity growth has been low even through the period of rapid economic expansion, especially when compared to the emerging economies of Asia. Economic output depends on both the volume of inputs (i.e. capital and labour) and the productivity of those inputs, known as total factor productivity (TFP). Growth in income is normally considered sustainable if it is backed by growth in underlying TFP. From 2001-2010, only 58% of per capita gross domestic product (GDP) growth in the region was derived from growth in TFP, whereas in the same period, 90% of per capita growth in China and 72% in the ASEAN 5 countries was explained by increases in productivity (Figure 3a).¹⁵

Figure 3b emphasizes this difference even further, as most emerging economies in Asia have made a significant positive leap in productivity, whereas none of the Latin American economies improved their productivity gaps during from 1980-2011.

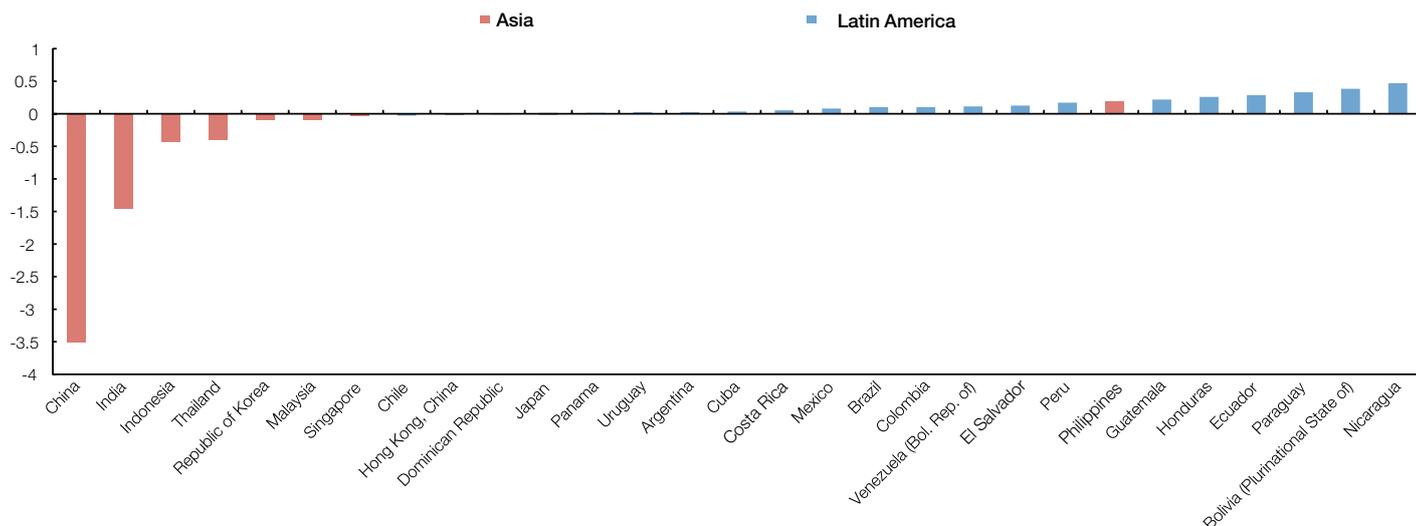
Figure 3: Drivers of Growth in Latin America/Caribbean and Comparator Regions 2014-2019



Source: Penn World Tables 8.0 (2013) and Powell (2014), where the figure was originally published.

Note: TFP indicates total factor productivity, K/Y indicates capital intensity growth, E/N indicates employment share growth and Y/N indicates average annual GDP per capita growth.

Figure 3b: Changes in Productivity Gaps between Selected Asian and Latin American Countries (1980-2011) as Percentages, Annual Growth Rates in GDP per Worker

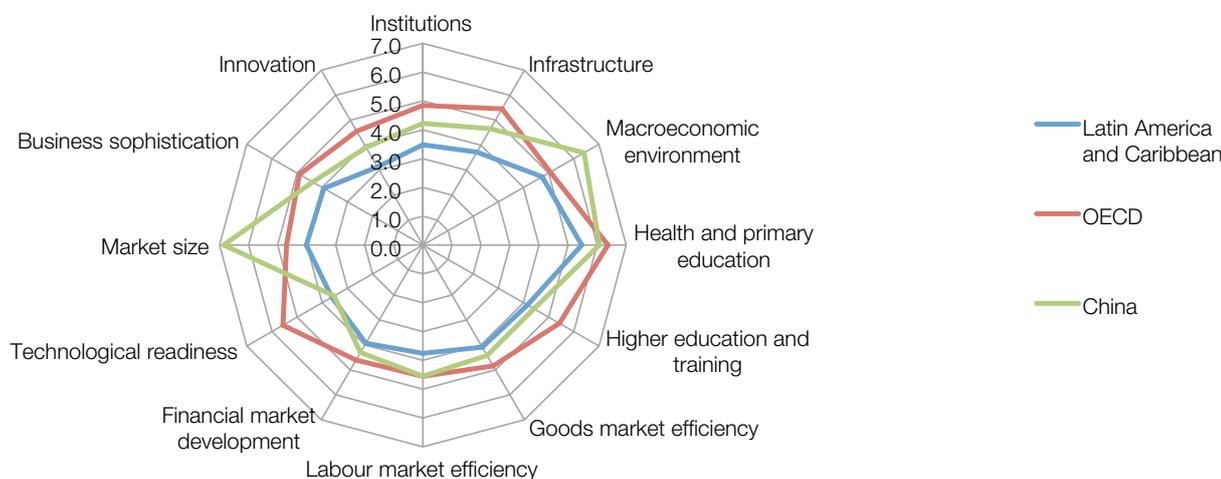


Source: Latin American Economic Outlook 2014, based on authors' calculations of World Bank, World Development Indicators and CEPALSTAT data. <http://dx.doi.org/10.1787/888932906787>.

As Figure 4 illustrates, the results from *The Global Competitiveness Report 2014-2015* indicate that Latin America continues to lag in virtually all of the key dimensions of competitiveness compared to advanced economies and emerging economies such as China. While variances exist among countries across all pillars,¹⁶ some of the most

consistent lags across all Latin American countries are observed in the areas of innovation, technological readiness, and higher education and training, highlighting the negative impact that the region's lack of skills and innovation continues to have on productivity (see the Appendix for individual country scores for all 12 pillars of competitiveness).

Figure 4: Comparative Performance on 12 Pillars of Competitiveness



Source: World Economic Forum *Global Competitiveness Report 2014-2015*

Two of the most significant factors leading to the region's lagging productivity are: 1) the lack of implementation of structural reforms and 2) insufficient investments in key areas such as infrastructure, education and innovation. Implementing structural reforms can address the productivity challenge by fostering competition, enhancing the functioning of the labour market and reducing the region's reliance on informal economic activities. The region's low investment in key areas such as ICT infrastructure, skills development and training, and R&D has been another barrier to reaching its productivity potential.

A call for action

Latin America's growth is slowing, and remains highly vulnerable to external conditions unless the region strengthens the fundamentals of its economies and boosts productivity. This paper focuses on two of the largest gaps causing the region's lagging productivity: skills and innovation. Subsequent sections analyse the various dimensions of the region's skills and innovation gaps to explore the key underlying factors and begin developing actionable insights for Latin American leaders.

3.2 Current State of Latin America's Skills and Innovation Challenges

Introduction

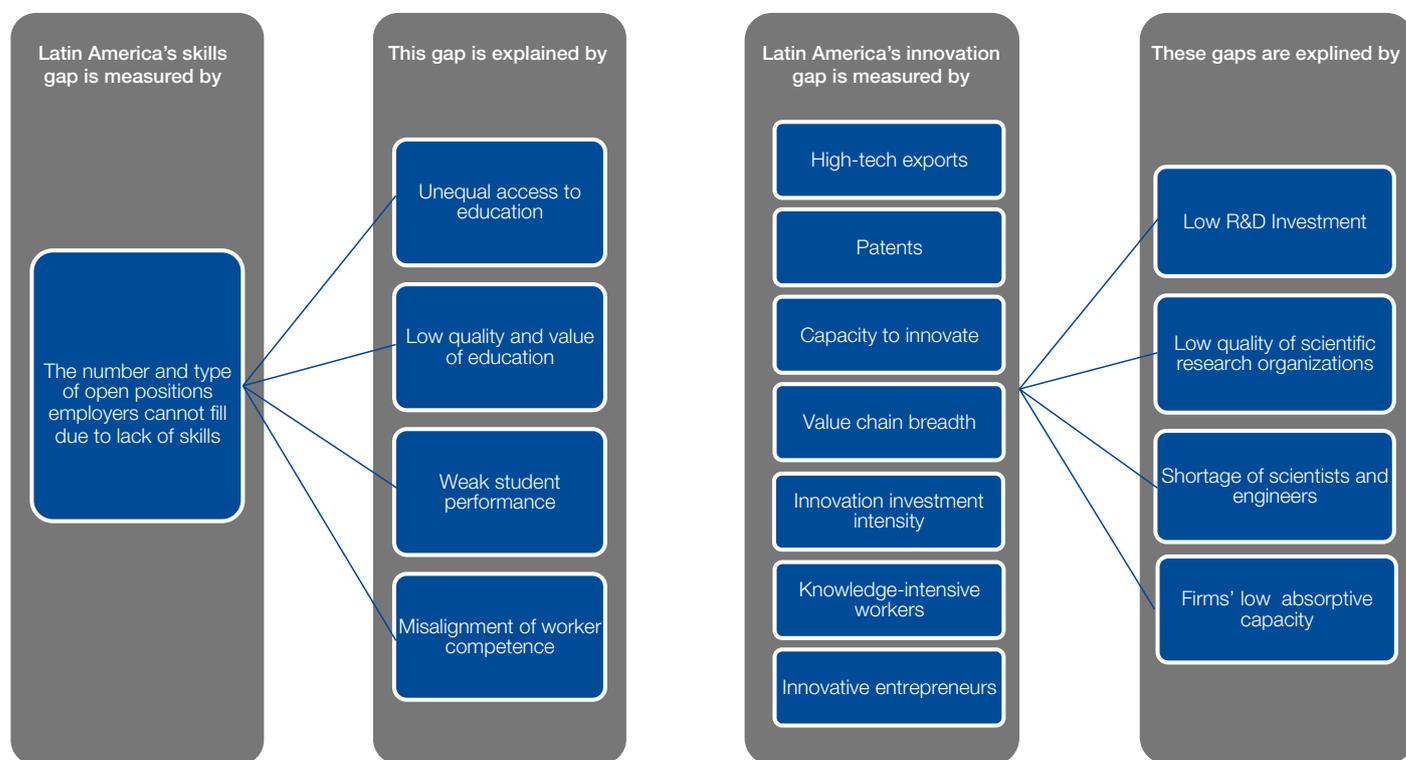
This section assesses the current state of Latin America's skills and innovation challenges using the relevant performance indicators from the existing literature, distinguishing between indicators that measure the actual state of the skills and innovation gap and those that measure the underlying conditions or determinants, as illustrated in Figure 5.

The current state of the skills gap is measured by the number of vacancies that firms cannot fill and employers' reports on the types of skills they have the most difficulty finding, which highlight the mismatch between existing skills and those

that are needed in the economy. This mismatch is due to the region's unequal access to education, the perceived low quality and value of the education and training systems, and persistently weak performance on international student tests.

The current state of innovation is measured by the output of innovative activities (e.g. high-tech exports, patents) and capabilities at the firm level (e.g. capacity to innovate, innovation investment intensity, value chain breadth) and the individual level (knowledge-intensive workers and opportunity-driven entrepreneurs). Indicators that explain the lagging performance in innovation include low levels of R&D investment, particularly from the private sector, as well as a shortage of scientists and engineers, the low quality of scientific research institutions and firms' poor absorptive capacity (the ability to adopt and use new technologies).

Figure 5: Measuring the Skills and Innovation Gap and Underlying Factors



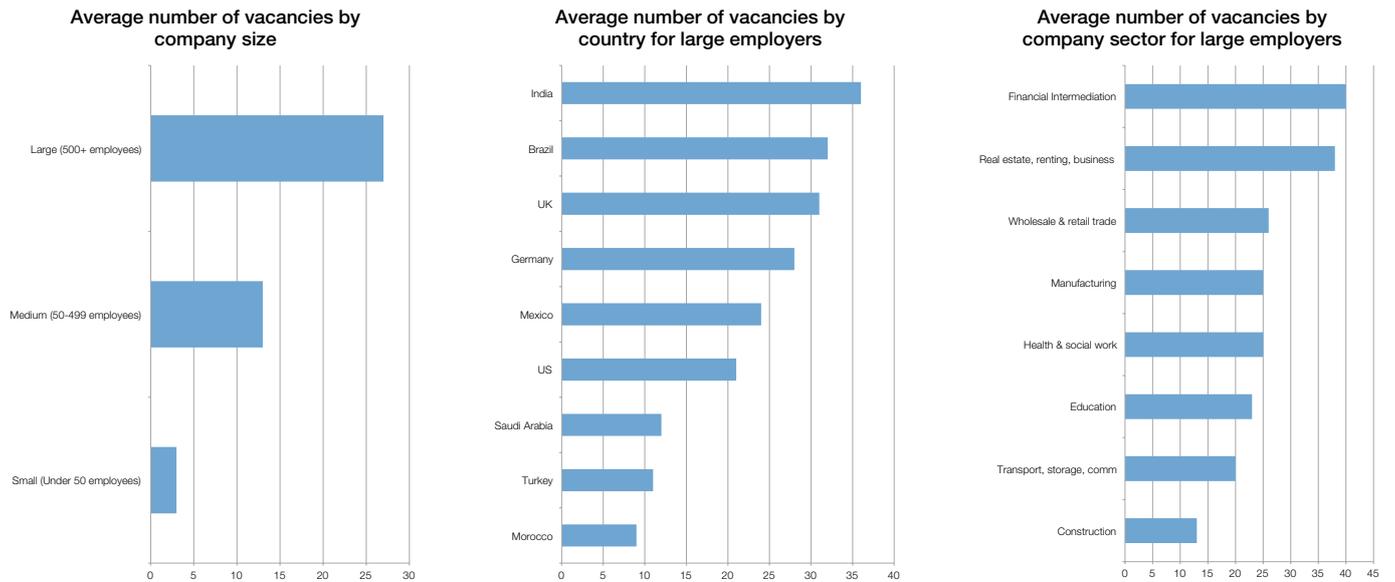
Latin America's skills gap and mismatches in the region's labour markets: current state

Despite a sharp increase in the overall labour force participation in Latin America during the last two decades, companies in the region report significant numbers of unfilled positions (Figure 6a).¹⁷ Employers have been unable to find the right workers for these vacancies because either workers are not sufficiently trained to perform the duties required or are not trained in the types of skills employers need for the open positions.

37% of companies in the region believe finding a workforce with the necessary training is one of their main obstacles for carrying out their activities, with technical vacancies being the most difficult type of positions to fill. This figure is higher than the global average and the average for other developing

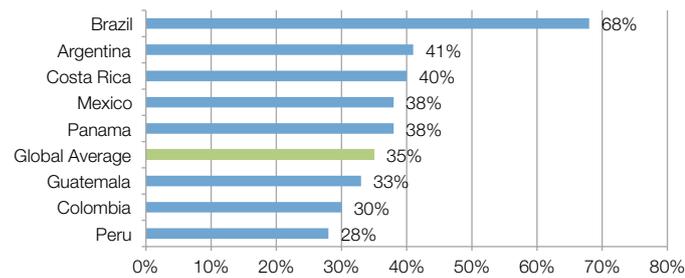
regions.¹⁸ As illustrated in Figure 6b, 68% of managers in Brazil have difficulty filling positions, followed by Argentina (41%), Costa Rica (40%), Mexico (38%) and Panama (38%).¹⁹ Brazil also reports the region's largest gap between the employers' perception of urgency of finding a workforce with the right skills versus how prepared they feel to address this gap.²⁰ Employers in Latin America reported a higher level of urgency for improving workforce capabilities than employers in most other regions, as well as a higher urgency for improved company learning and development capabilities compared to all other regions except for Africa.²¹

Figure 6a: Number of Vacant Positions as Reported by Employers



Source: McKinsey Survey, Aug-Sept 2012. Responses to question: "Roughly how many vacant full-time entry-level jobs does your company currently have?"

Figure 6b: Percentage of Employers Experiencing Difficulty in Filling Jobs



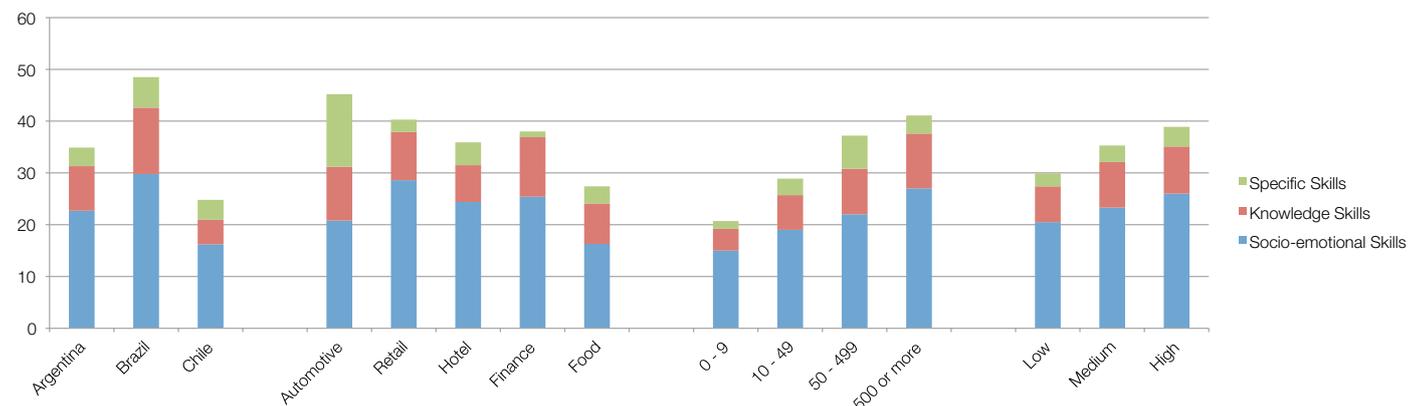
Source: Manpower Group 2013 Talent Shortage Survey

The most frequently cited reasons for the difficulty in filling jobs by Latin America's employers are in line with global responses, such as a lack of technical skills, inadequate number of applicants, and lack of experience. Employers are

also increasingly looking for non-cognitive, socio-emotional skills, also known as "soft skills". These include elements such as critical thinking, responsibility, teamwork, the ability to solve problems and handle change, oral and written communication, and the ability to understand and relate to one's environment. Managers in Latin America appreciate such skills sometimes even over technical skills, whether general or specific, but say it is very hard to find workers who have them.²²

In a survey conducted by IADB in three Latin American countries (Argentina, Brazil and Chile), these soft, or socioemotional, skills were valued more highly by employers than any other type of skills, weighing the importance of socioemotional skills as twice that of knowledge-based skills and almost four times the importance of industry-specific skills. As illustrated in Figure 7, respondents not only valued socioemotional skills as the most important, but also found it to be the most difficult to hire.

Figure 7: Difficulty of Finding Skills by Country, Sector and Company Attributes (% of Respondents who Found the Skill Difficult to Find)



Source: Bassi et al. IADB 2012

Underlying factors behind the skills gap and mismatch

Firms in Latin America are experiencing difficulty in finding workers with the right level and type of skills due to the lagging performance of the region's education system, measured by 1) access to education, 2) quality of education, 3) on-the-job training, 4) student performance and 5) a misalignment of worker competence, as perceived by education providers, workers and employers. The sections further discuss these dimensions in the region.

Access to education

Latin America suffers from insufficient and unequal access to education. Only 30% of young people from the quintile comprising the poorest students and those from rural areas complete secondary education, compared to 83% of those from the wealthiest quintile and 60% of those from urban areas.²³ The percentage of the Latin American workforce that reaches tertiary education is 12%, significantly behind the 24% of the Organisation for Economic Co-operation and Development (OECD) workforce.²⁴ Tertiary enrolment has been particularly low in the fields of science and technology, as the distribution of Latin American university students is concentrated mainly in the social sciences and humanities. This distribution differs significantly from that of the OECD economies, where most countries display a greater concentration of graduates in the fields of engineering, science and technology.

The student dropout rate has also had a major effect on the skill level of the workforce. Although some progress has been made, the overall dropout rate among 15- to 19-year-olds in the region averaged about 29% in 2009, and nearly half of these dropped out before secondary school. This high dropout rate yields two negative effects. First, a large number of those who drop out leave the education system without gaining the knowledge and skills needed to be employable in more sophisticated and high-value-added sectors. Second, since one of the main reasons for dropping out of school is the need to find work for subsistence, this leads young people to enter the job market with little education, increasing the likelihood that they will remain in low-skill, low-wage sectors.²⁵ This highlights one of the significant bottlenecks against resolving the region's skills gap, as students who drop out to begin working disproportionately come from low-income households.

Quality and value of education

Latin America lags behind OECD and other developed nations in the quality of education it offers. This characterization applies not only to primary, secondary and tertiary education but also to the supply of lifelong learning. Latin America's average score was lower than that of high-income OECD countries on a series of relevant parameters in *The Global Competitiveness Report*, as illustrated in Figure 8. The indicators discussed in this report are: 1) quality of the educational system, 2) quality of maths and science education in schools and 3) quality of management schools.

The results demonstrate a lagging performance overall, with the largest gap in the quality of maths and science education. None of the Latin American countries scored higher than the average score of high-income OECD countries in the quality of their maths and science education.²⁶ Costa Rica was the

only Latin American country with a score above the average score of high-income OECD countries for the quality of the educational system and extent of staff training. Chile and Costa Rica were the only countries that reported a higher score than the average score of OECD countries for the quality of management schools.

Quality of education can also be measured by an education earnings premium, or the additional wage a worker receives as a result of further educational attainment. After a generally rising education earnings premium throughout the 1990s, data across Latin America demonstrated a decline in this premium during the 2000s.²⁷ This decline has two potential explanations: 1) the supply of highly educated workers has exceeded the demand for them, hence lowering the value of tertiary education or 2) the type of skills that workers obtain are not the ones employers need. Our analysis indicates a high likelihood for the second explanation – there is an unmet need, and the falling education earnings premium highlights the mismatch between the supply and demand rather than an excess in the supply.

On-the-job training

Quality training can be provided beyond the boundaries of a formal education system. Companies can mitigate the ill effects of a poor education system and bridge the observed skills mismatch in the region by providing targeted on-the-job training to their new employees. However, training need not be limited to new hires, as the rapidly changing needs of the labour market necessitate a continuous, lifelong approach to learning. The Global Competitiveness Index measures the quality of on-the-job training using two questions from the Executive Opinion Survey: 1) to what extent are high-quality, specialized training services available and 2) to what extent do companies invest in training and employee development? Scores (7 = best) from these two questions are averaged in Figure 8, revealing a regional average of 4.0, significantly trailing (by ~13%) the OECD average of 4.9 with a few exceptions from Bolivia (4.8) and Peru (4.8).



Figure 8: Quality of Education and Training in Latin America vs OECD Countries

Latin American Countries	Score (7 = best)				Rank (1 = best)			
	Quality of the educational system	Quality of maths and science education in schools	Quality of management schools	On-the-job training	Quality of the educational system	Quality of maths and science education in schools	Quality of management schools	On-the-job training
Argentina	3.0	3.2	4.8	4.0	113	112	34	79
Bolivia	3.3	3.1	3.0	4.8	93	116	131	107
Brazil	2.7	2.6	4.5	4.0	126	131	53	45
Chile	3.7	3.5	5.4	4.2	71	99	13	46
Colombia	3.4	3.3	4.3	4.5	90	109	69	73
Costa Rica	4.7	4.4	5.3	4.2	21	47	16	26
Dominican Republic	2.6	2.1	3.6	4.1	132	142	109	80
El Salvador	3.8	3.4	4.3	3.6	63	103	64	55
Guatemala	2.7	2.5	4.7	4.2	127	135	41	40
Honduras	3.2	2.9	3.6	3.3	100	121	111	57
Mexico	2.8	2.7	4.2	3.8	123	128	70	62
Nicaragua	2.7	2.7	3.7	4.0	130	130	106	109
Panama	3.5	3.3	4.2	3.2	83	107	71	54
Paraguay	2.3	2.3	3.1	4.0	139	138	129	124
Peru	2.5	2.3	4.2	4.8	134	139	77	92
Uruguay	2.9	2.9	4.3	4.0	117	122	65	78
Venezuela	2.6	3.1	4.1	4.2	131	118	82	130
Latin American country average	3.1	3.0	4.2	4.0				
High-income OECD country average	4.5	4.8	5.1	4.9				

- Countries that scored above high-income OECD countries' average score
- Countries that scored from 75-100% of the value of high-income OECD countries' average score
- Countries that scored below 75% of the value of high-income OECD countries' average score

Source: World Economic Forum *Global Competitiveness Report 2014-2015*

Student performance

International comparisons using the Programme for International Student Assessment (PISA) scales in reading, mathematics and science provide measurable evidence that corroborates the above indicators, as 15-year-old students in the region scored far below those in OECD countries in reading, mathematics and science. No country in Latin America exceeded the OECD average score (Figure 9). As Table 1 shows, approximately 49% of 15-year-old Latin American students scored at the lowest possible level in reading tests, whereas about 19% of students in OECD countries scored at that level. Similarly, 84% and 80% of Latin American students tested achieved the lowest possible level in mathematics and science, respectively, twice the rates of those from OECD countries.²⁸

Underperformance by girls may also explain the underutilization of women in the workforce, which at 52.9% in 2010 was well below that of men at 79.6%.²⁹ Despite recent reports indicating that Latin America has reached gender parity in primary education, and is the only developing region in which gender disparity favours girls in both secondary and tertiary education, boys still outperform girls in maths and science PISA tests in virtually all Latin America countries.³⁰

Figure 9: Mean Scores in PISA 2012

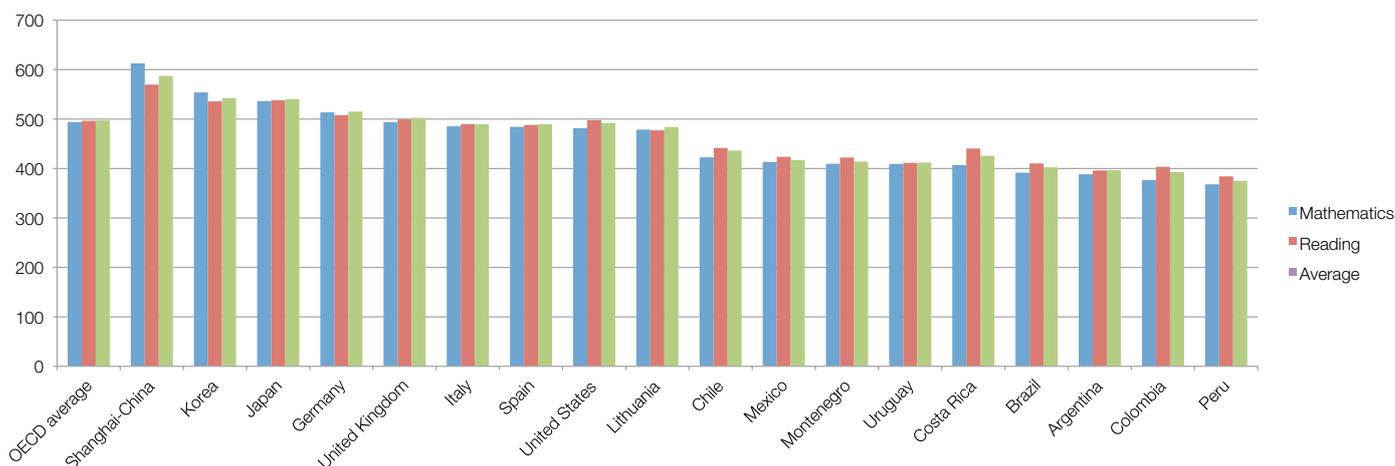


Table 1: Latin America and OECD: Students Aged 15 and over with the Lowest Score on the PISA Tests (%)

Country	Reading	Mathematics	Science
Argentina	51.6	84.3	79.1
Brazil	49.6	88.1	83.0
Chile	30.6	78.3	67.4
Colombia	47.1	90.8	84.3
Mexico	40.1	79.1	80.9
Panama	65.3	92.6	88.3
Peru	64.8	90.4	90.0
Uruguay	41.9	72.7	71.9
Latin America Average	48.9	84.5	80.6
OECD Average	18.8	44.0	42.3

Source: OECD Programme for International Student Assessment 2012

Misalignment of worker competence

The observed mismatch between the types of skills needed by employers and the skills provided to students by the region's education system can be explained further by analysing the differences in perception among education providers, new hires and employers. A McKinsey survey of nine countries including Brazil and Mexico reveals a wide gap between the perspectives of employers and education providers on the competence of new hires. With education providers assessing graduates as far more competent than the employers. Another gap exists in perceptions of how to reach competency, this time between the new hires and education providers. For instance, 58% of youth reported that practical, hands-on learning is an effective approach to training. However, only 24% of academic-programme graduates and 37% of vocational graduates said that they spend most of their time in this manner.³¹ These findings reveal that the difficulty in finding the right type of skills is not limited to a particular sector or a stage, but is a systemic issue rooted in deeper issues of beliefs, attitudes, and traditional methods of learning and teaching.

Latin America's innovation gap: current state

Acknowledging that innovation is a systemic phenomenon that requires not only advances in technology but also corresponding improvements in policy, people, strategy and processes, this paper explores the current state of Latin America's innovation ecosystem using indicators of innovative activities and capabilities. The indicators used to measure innovative output are 1) high-tech exports and 2) number of patents. The region's innovative capabilities, both technology driven and non-technological, are measured by its 3) capacity to innovate, 4) value chain breadth and (5) firms' innovation investment intensity, as well as by the presence of workers who are most likely to produce innovation: 6) the number of knowledge-intensive workers and 7) innovative entrepreneurs.

High-tech exports

Latin America lags significantly behind the advanced economies in its production of innovative goods, as indicated by its low production of high-tech exports. Latin America's 2008 export of labour and resource-intensive manufacturing goods was 11% of its total manufacturing exports, whereas the global and OECD average were 9% and 8%, respectively.

For El Salvador and Honduras, the percentage was 51% and 30%, respectively.³² Conversely, the region's high-tech exports as a share of total manufacturing exports was 7.7%, compared to the OECD average of 14.5%.³³ High-tech exports are even scarcer outside the manufacturing sector, totalling only 4.0% of all net exports across all sectors.³⁴ This average must be interpreted with certain caveats – for instance, Costa Rica's high percentage (15.3%) of high-tech exports can be explained by Intel's share of activity in this small economy, and *maquila* activities may have a similar effect on statistics in Mexico (14.7%).³⁵ When the three highest performers – Panama, Mexico and Costa Rica – are taken out of the calculations, the average high-tech export share for the region is merely 1.2%.

Number of patents

One measure of the region's creativity is the number of patents it generates. By this measure, Latin America also reports a significant gap compared to leading nations. In 2013, 85% of the worldwide 205,300 Patent Cooperation Treaty applications were filed by firms, and over 75% of these came from the United States, Japan, China, Germany and the Republic of Korea. By contrast, Mexico and Brazil, two leading Latin American countries in this measure, filed only 661 and 233 applications (~0.004% of the total), respectively.

What is innovation?

Many definitions exist for the word innovation. In the context of this paper, innovation is defined as the capacity to generate, absorb and use technology and non-technology based knowledge to create new products, services, processes or organizational change that can add higher economic, social or environmental value.

Capacity to innovate

The region's innovative performance can be broadly measured by its capacity for innovation, a measurement from the World Economic Forum's Executive Opinion Survey that captures how firms obtain technology. Scores range from 1 (a firm that obtains technology exclusively from licensing or imitating foreign companies) to 7 (a firm that conducts formal research and pioneers its own new products and processes). By this measure, Latin America's capacity for innovation (3.5) is lower than the high-income OECD average (4.6), implying that an average Latin American firm is more likely to utilize technologies from other sources than develop its own in house. However, this indicator should not be taken as the sole measurement of a firm's innovative potential,³⁶ as successful innovators can come from the low end of the market and then move upmarket as an innovation leader, a model that emerging markets such as China and India have used to great success.

Employing a disruptive model of innovation successfully, however, requires strategic vision and creativity at the managerial and leadership levels to generate innovation by improving upon an existing technology, and by introducing non-technological innovations in other parts of the value chain such as marketing, personnel management and logistics. The recently established Stanford-LSE World Management Survey that compares the managerial quality of manufacturing firms

that have over 50 employees globally ranks Argentina, Brazil, Chile and Colombia among the lowest in the sample.³⁷ As explored in the discussion of the region's skills mismatch, this is further evidence that Latin America's average firm may lack sufficient managerial skills to develop a strategic vision and establish routines for adopting new technologies or forward-looking personnel management strategies.

Value chain breadth

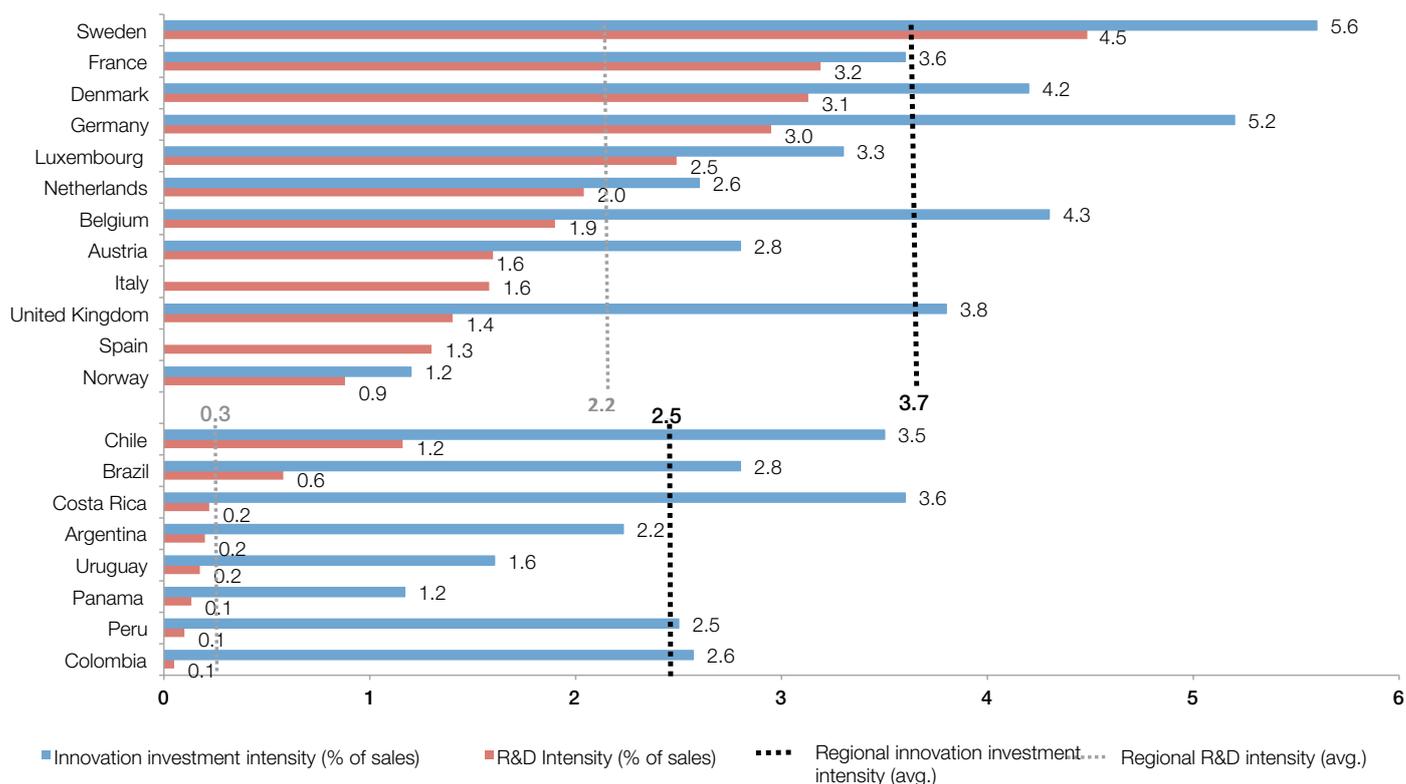
Innovative capability is not only the ability to generate new knowledge, but also to absorb and use knowledge in new and unique ways. A firm that has a narrow presence in the value chain – in other words, it is primarily involved in individual steps of the value chain – is likely to have fewer opportunities and capabilities to adapt existing knowledge into innovative goods, services or processes. By contrast, a firm that has a presence across the entire value chain (e.g. including production and marketing, distribution, design, etc.) is more likely to identify opportunities for innovation among different goods, services and processes. On a scale of 1-7 from the World Economic Forum's Executive Opinion Survey (7 = a broad presence across the entire value chain), Latin America's regional average is 3.8, close to the global mean of 3.9. No country in the region, however, has a score higher than 4.5. Latin American countries score significantly lower than the most innovative economies in the world, such as Japan (6.1), Germany (5.9) and Switzerland (5.9).

Innovation investment intensity

Innovation investment intensity helps identify a firm's commitment to pursuing innovation, defined as a percentage of sales, including its investments in R&D, training, machinery and equipment, software licenses and royalties for the use of patented technology. Even using this broader definition of innovation investment, a significant gap exists between firms in Latin America and those in advanced economies. While the average firm in a developed country spends almost 4% of sales on innovation, the typical firm in Latin America and the Caribbean spends around 2.5% (Figure 10).³⁸

Figure 10: Innovation Investment Intensity in Firms

. Innovation investment in firms



Note: Data are from 2010. The latest available data for Ecuador are from 2008, and from 2007 for the United States and the OECD. The nearest available data for 2000 for Brazil, Denmark, Ecuador and Sweden are from 2001, and from 2003 for Costa Rica.

Knowledge-intensive workers

The percentage of the workforce employed in knowledge-intensive sectors measures the presence of workers who are the most likely to generate innovative ideas and bring them to market. It is worth noting that the workforce in some countries with the highest percentage of knowledge workers may have few options to work outside of knowledge-intensive services due to the size and production structure of the economy, such as Luxembourg (57.2%), Singapore (51.0%) and Switzerland (49.8%). A fairer comparison, therefore, may be to compare Latin American countries to other economies with abundant natural resources that are also leading the world in innovation, such as the United States (36.3%), Canada (43.8%) and Australia (42.9%). Even with this caveat, Latin America shows a relative shortage of knowledge workers, with 17.0% the region's workforce in knowledge-intensive services. This demonstrates the region's continued reliance on low-skill, labour-intensive sectors with low innovation and productivity potential.

Innovative entrepreneurs

Entrepreneurs contribute to structural changes in the economy by helping to introduce new knowledge-intensive products and services, which bolsters the economy's productivity and innovation capacity.⁴⁰ A caveat when using entrepreneurial activity as an indicator of innovation, however,

is the "innovative orientation" of the region's entrepreneurs: innovative orientation represents the perceived extent to which an entrepreneur's product or service is new to some or all customers and where few or no other businesses offer the same product.⁴¹ Approximately 40% of Latin American entrepreneurs report that they offer a new product or service to their consumers, and 45% report that their products are new in the market and have no substitute good or service.⁴² Latin America as a whole lags behind the advanced economies of Europe and North America on both measures, and behind other emerging economies in Asia on the percentage of new products. Asia Pacific and South Asia show the largest proportion of new products, led by highly innovative economies like Japan, Korea and China. This implies a relative lack of local competition, which may negatively impact Latin American firms' appetite for further innovation.

Underlying factors of the innovation gap

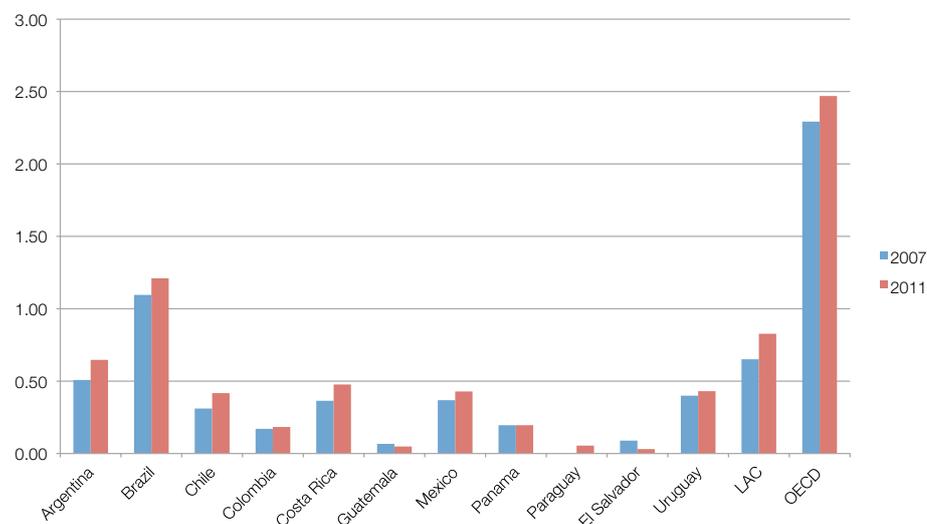
R&D investment

A record of strong R&D investment, while far from the only requirement for a vibrant innovation ecosystem, is a significant indicator that explains the region's innovation performance. True progress in innovation, however, requires matching R&D investments with a series of investments in

improving capabilities, human resources and the productive application of new ideas.⁴³ Latin America's investments in R&D accounted for 0.8% of GDP in 2011, significantly below that of advanced economies (e.g. 2.5% on average in OECD

countries) or emerging markets, e.g. China at 1.6% (Figure 11).⁴⁴ Recent improvements in R&D investment rates continue to be driven primarily by the public sector, while private R&D remains low and dominated by a few very large companies.

Figure 11: R&D Investment as percentage of GDP, 2007 vs 2011



Source: World Bank database, <http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS>

Note: LAC is an average of Latin American and Caribbean countries with available data. For Chile and Panama, the latest available data are 2010 figures.

Quality of scientific research institutions

The overall quality of scientific research institutions (as perceived by managers in a country) highlights the importance of universities and other institutions for fostering innovation. According to the latest responses from the World Economic Forum's Executive Opinion Survey, Latin American countries lag significantly behind the world's leaders in this measure, with top five nations globally reporting a score above 6 on a scale of 1-7.⁴⁵ The average score of 5.2 by high income OECD countries is significantly higher than the average score of 3.4 by Latin American countries, although Costa Rica (4.8), Argentina (4.1), Brazil (4.0), and Chile (4.0), trail close behind.⁴⁶

Availability of scientists and engineers

According to the World Economic Forum's Executive Opinion Survey, Latin America's average score in the availability of scientists and engineers is 3.7 out of 7, which is lower than the OECD average of 4.7 and trails significantly behind highly innovative economies like Finland (6.3) and Japan (5.5). This negative perception of quality may be an important measure when discussing the root cause of low levels of industry-university collaboration in the region.

Firms' absorptive capacity

At the firm-level, demand for innovation could be measured by a firm's technology absorption, or the level at which they adopt new technologies: the greater the need and ability to absorbing new technologies, the greater the level of innovation. Results of the Latin American National Innovation Surveys also conclude that absorptive capacity also affects a firm's cooperative behaviour, as absorptive capabilities were found as important drivers for forming both internal and external linkages.⁴⁷ On this measure, the World Economic Forum's Executive Opinion Survey asks the question "in your country, to what extent do businesses adopt new

technology?" Responses to this question indicate that Latin America trails behind the OECD average of 5.5 on a scale from 1 to 7, with a regional average score of 4.6.

Conclusion

This section assessed the current state of Latin America's skills and innovation gaps by surveying relevant performance indicators from existing literature. The analysis was structured on two levels. First, indicators that measure the current skills and innovation gap were explored. Second, indicators that measure the underlying conditions or determinants of the gap were analysed.

This exploration of the nature of the region's skills gap reveals a mismatch between the level and type of skills provided by the region's education system and the skills needed by the region's employers. Several underlying factors, most notably poor student performance, explain the region's struggle to establish a highly skilled workforce. Similarly, an exploration of the region's innovation gap revealed low levels of innovation output and capabilities, which are explained most notably by the persistently low levels and quality of innovation and R&D investments.

An important consideration in this analysis is the relationship between the skills and innovation challenges and their negative impact on productivity and competitiveness: the region's lack of skilled workers negatively affects virtually all indicators of innovation, including the quality and number of workers who are capable of generating innovation, which in turn limits firms' absorptive capacity. Low levels of innovative activities, in turn, suppress the economy's demand for highly skilled workers, creating a vicious cycle of low productivity that continues to plague the region and limit its competitive potential.

3.3 Root Causes of Skills and Innovation Gaps in Latin America

Introduction

Latin America's skill and innovation gaps share a common set of root causes, characterized by the region's absence of strong framework conditions, insufficient and inefficient investment, coordination failures among key players, as well as production structure-driven conditions that are at once the causes and the consequences of the region's low productivity. All of these factors are shaped by the region's cultural and institutional beliefs and practices, which should be considered as part of any long-term strategy to address the region's productivity challenges.

Framework conditions

Despite recent improvements, Latin America does not yet possess a set of strong framework conditions – defined in this context as the fundamentals of a well-functioning economy – that enable and facilitate productivity and competitiveness. When framework conditions are weak, firms and individuals are not equipped to generate skills and innovation at their full potential. Selected framework conditions that are highlighted in this discussion are: 1) the intensity of local competition, 2) the availability of capital, 3) the regulatory environment, and 4) the availability and use of ICT infrastructure.

Intensity of local competition

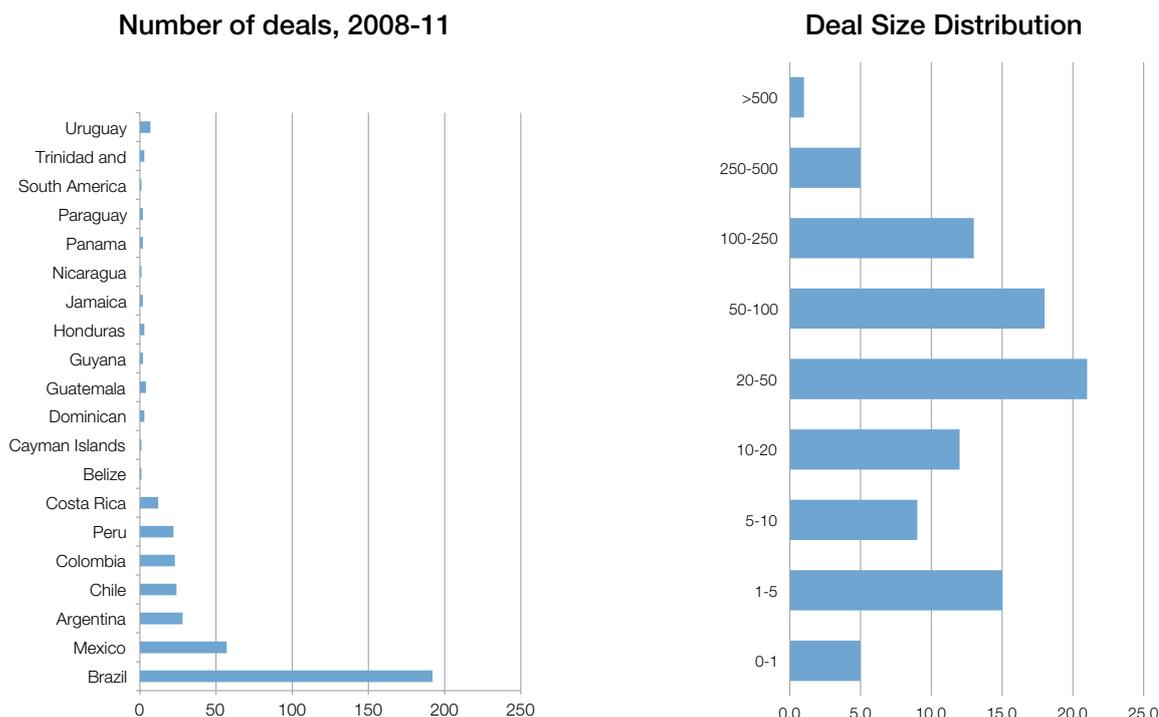
Intensity of local competition influences the demand for skills and innovation: high levels of competition are a basic condition for an efficient allocation of resources and also

create strong incentives for local companies to engage in innovative efforts as a mechanism to differentiate their offerings from others. Conversely, too little competition may provide insufficient incentives to invest in innovation. Evidence suggests that Latin America suffers from too little rather than too much competition, particularly in the market for inputs and non-tradable services.⁴⁸ The region reports a wide variance in this measure – on a scale of 1-7, in the World Economic Forum's Executive Opinion Survey, Venezuela scores 3.0, while Chile scores 5.4 (near the OECD average score of 5.5). It is clear, however, that the intensity of local competition is weak compared to the world's leading economies, such as Japan (6.2) and the United Kingdom (6.0), and highly innovative economies like Taiwan (6.1) and Korea (5.9).

Availability of capital

For Latin America's innovative entrepreneurs, the availability of capital remains problematic. Data show that most venture capital in Latin America targets large firms in traditional sectors, and angel investors are largely absent.⁴⁹ Even after a period of growth in the 2000s, private equity and venture capital (PEVC) investments have been low relative to the region's share of world GDP and capital inflows. In 2011, PEVC investment in Latin America and the Caribbean totalled \$3.2 billion, much lower than the \$18.7 billion in PEVC investments made in Asia's emerging markets. The uneven distribution of capital also remains an issue. As Figure 12 illustrates, more than 90% of PEVC activity took place in Brazil, Mexico and a few other major economies of South America; Brazil accounted for half of reported deals in and two-thirds of investments in 2008-2011.

Figure 12: Number and Size of Private Equity and Venture Capital Deals in Latin America and the Caribbean by Country, 2008-2011



Source: Mondragon, 2014

Note: Information on the size of the investment was not available on all deals.

Regulatory environment

A poorly designed and/or unstable regulatory environment is a significant barrier to developing skills and innovation, since it impairs the quality and efficiency of the interactions between the public and private sectors. For example, regulations governing tertiary education in Latin America do not always include a clear evaluation and accreditation mechanism, which has a negative impact on the quality of tertiary education as it relates to employment and productivity. In the telecommunications sector, the legal regimes in most of the region's countries are still oriented towards a service-based and segmented regulation that is not in line with current trends of technological convergence, in which providers of traditional communication services also offer innovations in data and multimedia services, leveraging the existing infrastructure to increase their return on investment.⁵⁰

Availability and use of technology

Availability of latest technology in Latin America is significantly lower than in the OECD countries (4.7 versus 6.0 out of 7 on the World Economic Forum's Executive Opinion Survey), with the exception of Panama. ICT use is correspondingly low – all major indices report dramatically lower ICT use by Latin American countries compared to more advanced economies, pointing to the region's weak ICT infrastructure (see Table 2).

Table 2: ICT Use in Latin America versus OECD Economies

Indicator	Latin America	OECD
ICT use and government efficiency	3.79	4.68
Individuals using internet, %	41.92	80.87
Broadband internet subscriptions/100 pop.	13.8	29.15
Int'l internet bandwidth, kb/s per user	34.75	350.53
Mobile broadband internet subscriptions/100 pop.	18.87	69.97
Mobile telephone subscriptions/100 pop.	120.95	121.81
Fixed telephone lines/100 pop.	15.5	40.7

Source: World Economic Forum *Global Competitiveness Report 2014-2015*, *Global Information Technology Report 2014*

Insufficient investment

A persistent underinvestment in higher education and on-the-job training, as well as insufficient investments in ICT infrastructure and R&D, are major causes of Latin America's skills and innovation gap. Investment in key areas of skills and innovation has traditionally been treated as a "fitting variable" rather than a strategic vector of growth in the region.⁵¹ In other words, these investments have increased during times of budget surplus, but are one of the first investments to be reduced in times of fiscal constraint.

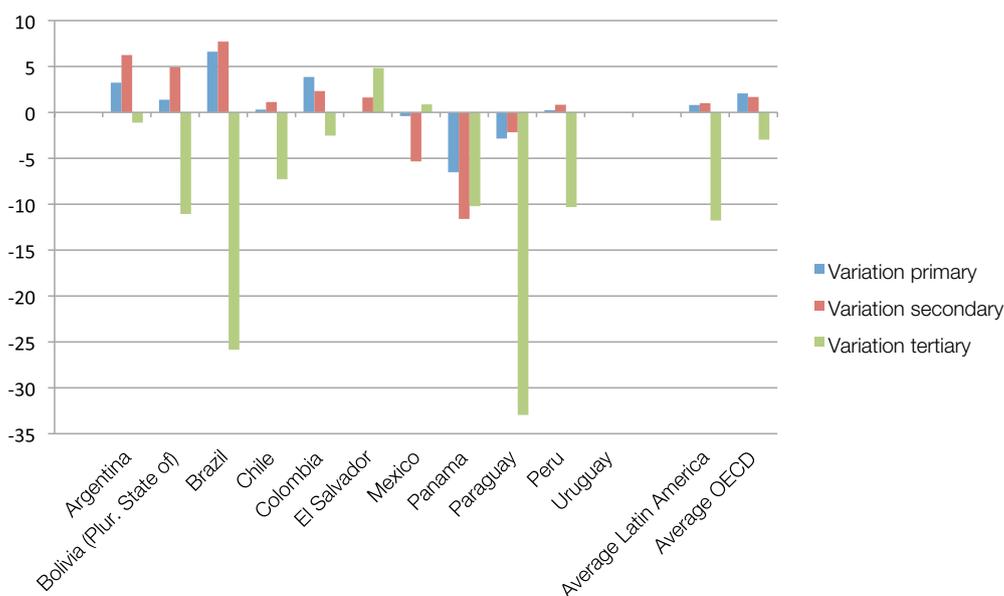


Investment in education and R&D

Investment in education, though greatly improved in recent years, particularly in primary and secondary education, still lags significantly behind the investment levels of developed nations. The efforts of most countries in the region in education and training have resulted in an increase in public spending on education from an average of 3.9% of GDP per year in the 1990s to about 4.7% today, while average public spending by the OECD countries is over 12%.⁵² Investment over time by education level shows that the increase in investment in Latin America is concentrated on primary and secondary education; most countries show a negative variation in tertiary education (Figure 13), which explains the lack of sophisticated technical and socio-emotional skills discussed above.

In addition, as shown in Section 2, R&D investment has not shown significant progress despite wide acknowledgement of the underinvestment in this area and its negative impact on the region's innovation capabilities. R&D investment remains a largely public sector-driven effort. Little R&D is conducted in the productive sector, which implies production structure-driven limitations (e.g. small firms in the informal economy lack the resources to conduct R&D) and contributes to the shortage of coordination between the production and knowledge sectors, which is explored further below.

Figure 13: Variation of Spending Percentage between 2000 and Most Recent Year by Level of Education



Source: OECD/CAF/ECLAC (2011), <http://dx.doi.org/10.1787/888932522892>.

Inefficient and uncoordinated investments

Inefficient and uncoordinated investments dilute the value of the investments that are already in place and limit access to opportunities, further exacerbating the region's skills and innovation challenges. For example, as explored in the discussion of the skills mismatch, education systems in the region are failing to coordinate with employers to train their students in the most in-demand skills. In many countries in the region, innovation takes place mainly in urban centres where talent and support institutions are concentrated, which can create skills and innovation gaps at the sub-national level. In addition, a lack of collaboration and coordination between R&D institutions in academia and industry has negatively impacted the quantity and quality of innovation in the region. The prevalence of informal economic activities and small firms make structured and ongoing coordination among firms especially challenging. These missteps from both the private and public sectors result in investments that yield outcomes that are less impactful than they could be, either because the best knowledge is not utilized, or the timing of investment does not take into consideration the long gestation periods these types of efforts often require.

Inefficient allocation of investment

Investments intended to foster skills and innovation have not always generated their anticipated value in the region because they have remained too loosely – or at times, not at all – connected to the actual outcomes in the productive sector. The lack of a holistic, cross-sector strategy has created an imbalance in the types of investments governments have made, like a state-of-the-art laboratory without skilled scientists or researchers to derive the intended value from the facilities. The lack of continuity discussed in the insufficient investment section has been one of the factors causing these inefficiencies, as well as the lack of transparency observed in several of the region's government regimes in the past. Governments in the region have an opportunity to enhance the efficiency of their investments

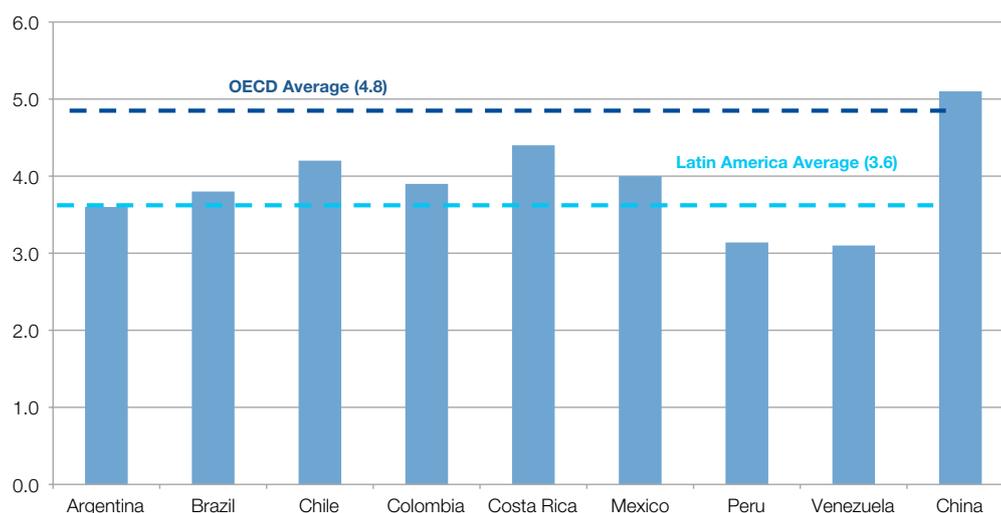
through strategic policies such as procuring advanced technology products. The World Economic Forum's Executive Opinion Survey suggests an opportunity for implementing strategic policies in this area, with Latin America's average score (3.3 out of 7) trailing below the global mean of 3.5 and the OECD average of 3.7.

Insufficient coordination

Stronger coordination and closer alignment among producers of innovation would minimize redundant efforts, garner process efficiencies and create a stronger linkage to the demands of the marketplace to increase the return on the region's collective R&D investment. Latin America's current state according to these measures of coordination reveals a gap. Respondents to the National Innovation Surveys in Latin America confirm that collaboration, interaction and cooperation are important for innovation, but the percentage of Latin American firms engaged in cooperative activities for innovation ranges from 5.7% (lowest) in Chile to 13.9% (highest) in Argentina, significantly below those of high-productivity economies like Denmark (22.2%), Sweden (21.4%) and Finland (19.2%).

Another key measure of coordination is the extent to which Latin America's businesses and universities collaborate on R&D. As Figure 14 illustrates, Latin America lags behind OECD countries as well as China on this measure.

Figure 14: University/Industry Research Collaboration in R&D (Scale of 1-7)



Source: World Economic Forum *Global Competitiveness Report 2014-2015*.

Production structure-driven causes

Although some Latin American countries are rapidly scaling up their high-tech production activities, the region's 1) high degree of specialization in labour-intensive and resource-based production, 2) prevalence of microenterprises and SMEs with low-skilled workers and limited innovative capabilities and 3) high degree of economic informality

(defined as economic activities and income that are partially or fully outside government regulation, taxation and observation) are causes and consequences of its productivity gap. These three conditions, which contribute to the region's skills and innovation gaps, are discussed below and outlined in Table 3.

Table 3: Characteristics of Latin America's Economic Structure and their Impact on the Region's Skills and Innovation Gaps

	Insufficient Investment	Inefficient Investment
Specialization in low-skill, resource-based production activities	<ul style="list-style-type: none"> – Firms traditionally had a low need for highly skilled workers, resulting in low investment in education and low enrolment in secondary and tertiary education. – Technology/research infrastructure was not prioritized by the government, as production activities did not depend on it. 	<ul style="list-style-type: none"> – Investment in education did not focus on technology-oriented subjects (e.g. engineering) or socio-emotional skills, since they were not required in low-skill, resource-based sectors. – Public research institutions did not form strong linkages with industry, as low-skill, resource-based production did not require extensive scientific research as a rule.
Prevalence of microenterprises and SMEs with low innovative capabilities	<ul style="list-style-type: none"> – Small enterprises lack the infrastructure and budgetary capabilities to provide training. – Small enterprises lack the financial means to invest in research or institute corporate venturing activities. 	<ul style="list-style-type: none"> – Small enterprises do not have a strong track record of collaborating with one another or with public education institutions to improve their workers' skills. – Small enterprises are less likely to possess the absorptive capacity to reap the benefits of existing technologies from larger firms.
High degree of informality	<ul style="list-style-type: none"> – Economic informality is a symptom of insufficient investment in skills and innovation, while the norm of informal participation reduces the urgency for skills and innovation. 	<ul style="list-style-type: none"> – A high degree of informal activities makes strategic investment and quality monitoring of investment difficult, which degrades firms' absorptive capacity.

These characteristics are both causes and consequences of the lagging performance of skills and innovation in the region. In other words, Latin America's focus on labour-intensive and resource-based industries resulted in a low demand for highly skilled workers, which has led to low investments in education, trapping the region in a cycle of low productivity that makes it more reliant on low-tech, informal economic activities and unable to generate more innovative capabilities. Therefore it is important to understand both the causes and consequences these conditions and how they influence one another.

Root causes: causes behind the causes

The region's weak fundamentals – the economic framework, insufficient and inefficient investment, coordination failures and production structure-driven conditions – are the underlying factors behind its skills and innovation challenges. The question, then, is: what are the causes behind these underlying factors? What are the deeply ingrained beliefs, biases, attitudes and practices that are acting as a bottleneck against a productive and competitive economy?

Four deeply ingrained and related causes are behind this problem. First, Latin America has lacked a long-term vision and strategy for sustainable productivity growth. Second, without a long-term vision and strategy to execute against the vision, it is difficult to bring the right players to the table. Third, it is just as difficult to establish and monitor standards of high quality. Fourth, the region's cultural beliefs and attitudes affect virtually all economic decisions and activities, and in many cases these beliefs and attitudes have been an impediment to setting a clear vision and strategy, engaging the right people and ensuring high quality.

1. Lack of a long-term vision, strategy and regional perspective

Long-term thinking about skills and innovation often does not fit political cycles or business investment horizons; but the lack of such long-term planning can perpetuate continued wasted potential in a country's population and losses for a nation's growth.⁵³ While it is possible that Latin America will begin to see positive outcomes from its increasing investment in education, the continued poor performance of its students in international tests in the critical fields of maths and science indicate a need for a more strategic, long-term investment into improving the quality of its math and science education in particular. A skills mismatch and a falling wage premium of secondary and tertiary education indicate that a long-term strategy is also needed to better align tertiary education with the needs of high-tech, high-value sectors. Similarly, Latin America's innovation systems lack a long-term strategy to tackle not only systemic and market failures but also to set thematic priorities, serving to reduce the "dynamic inconsistency" between the longer-term perspective of the research and innovation system and the shorter-term perspectives of the world of politics.⁵⁴

An opportunity exists in Latin America not only to increase the duration of its strategic vision and activities, but also to broaden its focus beyond individual economies to the entire region. As is widely acknowledged in the received theoretical and empirical literature, firms do not innovate in isolation, and

cooperation is key for technological activities. In developing countries, international cooperation could be more important than cooperation with national partners, since the knowledge and capabilities available within the country's frontiers may not be enough for firms wishing to develop ambitious innovative activities.⁵⁵ In addition to accessing advanced technologies and knowledge, a regional outlook and strategy could also improve firms' innovative capabilities by giving them access to larger consumer markets, as well as capital and financing mechanisms to support innovation and expand economic activities.

2. Ineffective or weak multistakeholder coordination and feedback loop for enhanced responsiveness to changing market conditions

Equally as important as establishing a long-term vision and strategy is engaging the right stakeholders to help execute this vision and strategy. Public sector investments in innovation, for instance, have remained too loosely attached to the productive sector, which hinders the creation of stronger links between the knowledge and production sectors – and the receipt of a higher return on those investments. "Smart specialization" strategies, as a result of poor multi-sector coordination, have been rare in the region.⁵⁶

The educational and innovation ecosystems have remained too "lineal", with few feedback loops with the productive system to ensure that improvements or investments in education are tied to improvements in the innovation landscape, which should in turn be linked to measurable progress in productivity.⁵⁷

There also needs to be a connection between university research and the needs of companies, as demonstrated by the small number of industry-university R&D collaborations.⁵⁸ To a large extent, businesses in Latin America still rely heavily on incremental innovation based on product adaptation, resulting in a continued disconnect with the research carried out by universities and other research institutions.

Many innovative start-ups in the region encounter a significant challenge when they try to scale up their activities for continued growth. To expand, they require an infusion of capital from the public sector as well as from firms and private investors. Many large firms – which until now have focused on advanced economies outside Latin America, but are increasingly expanding their operations to emerging economies – are setting up corporate venture capital programmes to invest in innovative start-ups with high growth potential.⁵⁹ Governments can connect these actors by implementing programmes that connect start-ups to private resources that foster entrepreneurial capacity building and promote new forms of public-private collaboration to forge new synergies with emerging market trends such as corporate venture capital and open-innovation models.⁶⁰

3. Lack of quality management, monitoring and evaluation systems

The absence of a broadly accepted set of standards that governs the quality of education and innovation is simultaneously a symptom and source of root cause #2. Without consistent and structured engagement by all of the

stakeholders of the skills and innovation systems, it is not possible to develop a comprehensive quality management and evaluation system. Without such a system, continued coordination and alignment among the stakeholders becomes too complex and costly to be sustainable. Efforts have been made in the region to begin building a system of indicators to monitor innovation dynamics at the firm level, to improve innovation metrics in the region, and to improve the ability to monitor and evaluate the implementation of innovation policies.⁶¹ Successful examples exist in Latin American countries of establishing a common set of standards governing the quality of skills training, such as Mexico's national skills certification system, coordinated by the Job Skills Standardization and Certification Council (CONOCER), an agency affiliated with the Secretariat of Public Education and Secretariat of Labour and Welfare, with a three-part structure including representatives of the government (from the areas of agriculture, finance, education, the treasury, and labour, among others), business managers and workers.⁶²

Regardless of the scope, topic or target audience, all monitoring and evaluation systems must be capable of generating timely and relevant information on outcomes, and have established feedback loops and processes so that all participating stakeholders can adjust their strategy, budgetary decisions and resource allocation based on the output of the system.

4. Cultural factors

While there is no conclusive evidence of the effect of culture on economic growth and innovation, this report includes illustrations of the potentially limiting influences that certain cultural beliefs and practices may have on the region's productivity potential.

Preference for humanities: The current skills mismatch between what is offered by educational institutions and what is needed by the production sector goes well beyond a cultural issue, but one of the contributing factors to this problem may be Latin Americans' cultural preference for studies in non-scientific fields in universities.⁶³ Latin American students may prefer non-scientific studies for two reasons rooted in history and culture. First, universities in the region have historically emphasized the fields of social sciences and humanities. Second, young people may be attracted to fields of study that are relevant to pressing problems faced by their societies, which until recently have not been in the areas of advanced skills or innovative capabilities.⁶⁴ The IADB recently asserted that this preference for non-scientific studies may even be rooted in the attitudes of Latin American families, which have a strong say in the choice of post-secondary programmes for their children and continue to steer them away from more scientific and technical fields.⁶⁵

Bias against entrepreneurialism: Perhaps as an extension of this cultural bias against technical and scientific studies, some cultural barriers may still exist against a full pursuit of entrepreneurialism. In a survey of students from four top MBA schools in Latin America, respondents were asked if they planned to open their own business after receiving their degree. Most answered no, preferring to obtain employment

in a large multinational firm.⁶⁶ Despite the emergence of highly innovative, highly profitable start-ups in recent years, there may be a lingering perception that entrepreneurship is a "second-choice" career track, most likely due to the prevalence of low-innovation, low-profit microenterprises and SMEs that constitutes the majority of Latin America's entrepreneurial landscape.

Conclusion

Latin America's productivity suffers from weaknesses of framework conditions, such as local competition, capital availability, regulatory environment and ICT infrastructure. These conditions have resulted in insufficient investments in key areas of skills and innovation, as well as low returns on investment and poor coordination among key players. Latin America's reliance on labour-intensive and low-skill production structures is both the cause and the consequence of these challenges. All of these factors have their roots in the region's deeply ingrained cultural and institutional beliefs and practices, and any long-term strategies to address these productivity challenges must be mindful of these limitations that may, whether consciously or not, impact the actions and motivations of all relevant stakeholders in the region.

3.4 Overcoming the Skills and Innovation Gaps: Examples

Introduction

This section highlights selected examples from countries and organizations, both within and outside Latin America, that have begun to address their skills and innovation challenges through the effective use of public-private collaborations. As explored in the previous section, the root causes of the skills and innovation gaps in Latin America range from weak framework conditions and economic structure-driven barriers to patterns of underinvestment and inefficient investment, and are often exacerbated by insufficient coordination among key players in this area. All of these factors are also shaped by the region’s cultural beliefs and practices, which have limited the region’s overall productivity potential.

Many countries in Latin America have recognized these root causes and have begun to address them through policy, as illustrated by the government-led innovation initiatives and programmes detailed in Table 4. The success of these efforts requires long-lasting commitment from key stakeholders to mobilize resources and provide the effort that can lead to the necessary reforms and productive investments. However, stakeholders’ actions – most notably those in the public and private sectors – are not always well coordinated and aligned; thus synergies are often not fully realized and the results of the combined efforts are not maximized.

A well-executed public-private collaboration not only resolves the insufficient coordination issue in Latin America, but also addresses many of the deeper causes such as ensuring the continuity of a long-term vision strategy beyond political cycles and maintaining agility in an environment of rapid market changes. Examples include Mexico’s Job Skills Standardization and Certification Council CONOCER (Box 1) and Brazil’s industrial policy plan, *Plano Brasil Maior*, which was designed to boost private sector spending in R&D from

0.59% to 0.9%. Continuing to support the implementation of strategic public-private collaborations that go beyond the individual policies and strategies of government and business is crucial to regional efforts to boost productivity and competitiveness.

Box 1: Mexico’s National Skills Certification System

Mexico’s national skills certification system is overseen by the Job Skills Standardization and Certification Council (CONOCER), which is affiliated with the Secretariat of Public Education and the Secretariat of Labour and Welfare. It has a three-part structure including government representatives (from agriculture, finance, education, the treasury, and labour, among others), business managers and workers. CONOCER organizes Skills-Based Management Committees, represented by business managers and workers, which develop competency standards for their respective sectors with support from technical groups. These standards are then recorded in the National Registry of Competency Standards, which help develop training curricula in greater alignment with the requirements of the production sector, society, government and the education system, and are used as criteria in assessing and certifying various organizations and institutions. Only official Certification and Assessment Agencies accredited by CONOCER can train, assess and/or certify these labour competencies, based on the standards documented in the National Registry.

Source: OECD/GAF/ECLAC 2013

Table 4: Country-specific Initiatives to Boost Innovation in Latin America

Country	Initiatives
Argentina	<ul style="list-style-type: none"> – The Secretariat for Scientific and Technological Articulation aims to foster collaboration between academic agencies, universities and R&D institutions in research activities. – The National Interuniversity Council has a cooperation agreement with the Industrial Union of Argentina to work together in creating cooperation opportunities between the productive sectors, public and private universities, and the rest of the scientific and education system. – The INNOVAR Programme, founded in 2005, is a platform for launching products and/or processes that have outstanding design, technology or originality. It strives to foster an environment that is favourable to innovation. – The Network for Technology Linkage between public universities in Argentina aims to coordinate efforts in technology-related areas to promote knowledge contribution and cooperation. – The Fund for Scientific and Technological Research finances projects to improve infrastructure. – Projects in Strategic Areas and Productive Clusters Integrated Projects are intended to strengthen the country’s research and technological innovation capacity. – The goal of the Consulting Committee on International Programmes on Science and Technology Cooperation Abroad is to strengthen international linkages with R&D institutional representatives from other countries, and to establish contact with Argentinean scientists residing abroad.

Brazil	<ul style="list-style-type: none"> – COOPERA is a cooperation programme between institutes, technology centres and enterprises that provides financial support for R&D and innovation. – ASISTEC provides technological assistance and consultancy from technological research institutes. – The Support Programme for Research and Innovation in Local Productive Arrangements provides financial support for activities developed by science and technology institutes. – The Incentive Programme for Innovation in Brazilian Enterprises provides funding with tax incentives for implementing research, development and innovation projects in Brazilian enterprises. – The Brazilian Technology Network supports projects that involve collaboration between supplying enterprises and scientific-technological institutes. – The Mobile Units Programme supports the provision of technological services by technology research institutes to micro and small enterprises via mobile units.
Chile	<ul style="list-style-type: none"> – The National Fund for Scientific and Technological Development aims to strengthen and develop research in all knowledge areas, particularly those related to technology. – The Fund for the Promotion of Scientific and Technological Development funds R&D and technology transfer projects such as regional centres, technological entrepreneurial consortiums, the Innovation Programme for Innovation of Public Interest and the Incubators Programme – The Fund for Advanced Research in Priority Areas specializes in supporting groups of researchers gathered in centres of excellence. – Innova Chile promotes technological innovation in all forms and the transfer, adoption and spreading of technologies, focusing on private enterprises that support and promote innovation. – The Foundation for Agricultural Innovation promotes, coordinates and provides funding for development programmes and projects that encourage innovation in productive processes and industrial transformation.
Colombia	<ul style="list-style-type: none"> – The ICT Ministry's <i>Mipyme Digital</i> (Digital SME) programme involves large corporations helping their SME providers or distributors use ICT to optimize their value chains. For example, Cemex, a major global cement company, trained and provided online ordering for its SME customers. Such projects have helped increase SMEs' internet penetration from 7% in 2010 to 60% in 2014. – The Policy for Social Appropriation of Science, Technology and Innovation (STI) promotes community participation in STI and the training of science mediators and the creation of an STI culture. – The Colombian Agricultural Research Corporation generates scientific knowledge and technological agricultural development to improve competitiveness in production and the sustainable use of natural resources. – A co-funding mechanism subsidizes joint technological research programmes and innovation between enterprises and technology development universities.
Mexico	<ul style="list-style-type: none"> – The Tax Incentive Programme is a government-supported programme that invests in research projects and technological developments in the field of new products, materials and processes. – The New Fund for Science and Technology supports corporations that have applied for tax incentives for research and technology development. – IDEA is a support instrument for enhancing enterprises' technological capacity. – The Fund for Technological Innovation is a trust created by the Ministry of Economy to support micro, small and medium enterprises in innovation. – AVANCE is a programme created to stimulate the development of businesses based on scientific and technological developments. – The Sector Fund of Research for Education is a trust that supports scientific or technological research, innovation and technological developments.
Peru	<ul style="list-style-type: none"> – Centres of Technological Innovation serve as technological partners for enterprises that aim to increase their innovation capacity, competitiveness and productivity. – The Science, Technology and Innovation Fund was created by an IADB loan in 2006. Its primary role is to finance private enterprise or research projects and programmes to promote innovation and to improve competitiveness – The primary objective of the INCAGRO Project is to promote and strengthen the supply of non-financial services for innovation to establish a modern system, led by the private sector, to improve productivity and increase the profitability of the Peruvian agriculture and livestock sector.
Venezuela	<ul style="list-style-type: none"> – The National Center of Information Technologies aims to promote and back activities such as teaching, research, and scientific and technological development between institutions, academies and R&D centres. – Venezuela seeks to strengthen institutional projects such as the University of the South and the Institute of High Strategic and Historical Studies for Latin America and the Caribbean. – It has negotiated new cooperation agreements with equivalent institutions in the field of Science, Technology and Innovation with Argentina, Brazil, Chile, China, Cuba, Ecuador, India, Peru and Uruguay.

Selected examples: strategic public-private collaborations
 Given this backdrop of insufficient focus on public-private partnerships, government, civil and business leaders in Latin America can benefit from exploring initiatives that have leveraged these partnerships effectively to solve their skills and innovation challenges, which highlight many of the common root causes explored thus far. Two of the root causes are given particular emphasis – inefficiencies of investment and insufficient coordination – as effective private-public collaborations are likely to have the greatest impact on these causes, and they also help improve the region’s framework and production structure challenges. These lessons learned can be adapted to help foster an environment of trust and collaboration throughout the region.

The following elements are explored for each of the examples highlighted in this section:

- initiative overview
- challenge(s) addressed by the initiative
- actions taken
- role of the stakeholders
- outcomes and lessons learned

Examples that address inefficiencies of investment

Effective public-private collaborations can correct inefficiencies of investment by providing funding and strategic oversight in a specific sector that is deemed critical for enhancing the country’s productivity and competitiveness. Demand for additional investment in a specific area may originate from the public sector, as in Box 2, where the US president launched the “Educate to Innovate” campaign to spur private sector investment in STEM education. Demand for sector-specific allocation of investment can also originate from the private sector, and is often perceived as a lobbying effort. To address the root causes of inefficient investments, however, it is necessary to move beyond the transactional model of lobbyists and investors to a collaborative model, in which stakeholders are committed to maximizing the impact of their investments.

The Regional Fund for Digital Innovation in Latin America and the Caribbean (FRIDA), described in Box 3, is an interesting new model of public-private collaboration, in which a group of international organizations selects the most promising projects from Latin America’s private, public and civil organizations to provide funding and support, with the objective of improving the quality of the region’s ICT infrastructure. This example demonstrates that sources of investment need not be limited to a single region, and that sources of technical and creative solutions are not limited to the private sector.

Examples that address insufficient coordination

Inter-firm interaction and collaboration are important for innovation, but the percentage of Latin American firms engaged in cooperative activities for innovation remains low, as observed in the root cause analysis above. This is a symptom of Latin America’s broader structural challenges; most firms are small and in low-productivity sectors with high levels of informal employment. These firms are less likely to participate in higher-productivity, cooperative activities that can generate production linkages and positive knowledge

spillovers.⁶⁷ Public-private collaborations that increase coordination, therefore, play an important role in raising the economy’s innovation potential and overall competitiveness. Two types of firm-to-firm collaborations are highlighted: 1) Brazil’s policy to develop local production clusters fosters coordination among SMEs (Box 4) and 2) Finland’s venture accelerator programme facilitates the exchange of knowledge between large enterprises and small start-ups (Box 5).

Box 2: USA – Change the Equation

Initiative overview

In 2010, President Obama issued a call to action for the business community to deepen its commitment to improving student literacy in science, technology, engineering and maths (STEM) learning. More than 100 CEOs came together to form the Change the Equation coalition (CTEq). CTEq members collaborate to advocate for better policies and strengthen the impact of corporate philanthropy to improve STEM learning in the United States.

Challenge(s) addressed by the initiative

US students have been losing ground in STEM relative to their peers in other nations. Even at the height of the US recession, employers had trouble finding the skilled people they needed to stay competitive in the global economy. CTEq was formed at the urging of President Obama to address this critical challenge.

Actions taken

- CTEq enabled corporate leaders to use Vital Signs, which provides valuable data points on the national state of STEM learning, to advocate policies and practices that improve students’ STEM literacy.
- The CTEq’s Design Principles for Effective Philanthropy created standards with which to evaluate programmes in order to help funders get the highest return on their investment in STEM learning.

Role of the stakeholders

US corporations and private foundations fund the development and work of CTEq. The CTEq coalition lobbies state and local officials responsible for public education in each state.

Outcomes and lessons learned

CTEq reached over 40,000 students in its first year of operation. Aligning public and private stakeholders’ objectives has been a powerful motivator for continued collaboration. Companies’ desire for a STEM-literate workforce provides a strong incentive to help improve STEM literacy in the nation’s youth.

Source: World Economic Forum Competitiveness Repository

Box 3: The Regional Fund for Digital Innovation in Latin America and the Caribbean (FRIDA)

Initiative overview

FRIDA is an initiative of the Regional Registry for Internet Addresses for Latin America and the Caribbean (LACNIC) formed to help develop the information society in Latin America and the Caribbean by funding research projects and recognizing and rewarding innovative approaches in the use of ICT for development.

Challenge(s) addressed by the initiative

Weak ICT infrastructure and low ICT use, particularly for development and innovation, in Latin America and the Caribbean.

Actions taken

- In 2004-2005, the first phase of the FRIDA fund supported 26 research projects developed by organizations from 13 different countries in the region.
- In 2007-2009, the FRIDA fund issued three calls for proposals and supported 31 projects from 14 economies.
- The FRIDA Awards acknowledge the region's best initiatives. In contrast to the small grants format that emphasizes new pilots and research projects, the award system responded to the interest in identifying existing practices that can be scaled up and showcasing good experiences among decision-makers in the region.

Role of the stakeholders

- The Canadian government-sponsored International Development Research Center (IDRC) and the non-governmental organization LACNIC originally developed the FRIDA fund. It is now also supported by the Internet Society and the Swedish International Development Agency.
- Grants and awards are awarded to private, public and civil organizations based on the quality of their project proposals.

Outcomes and lessons learned

- FRIDA is a successful example of aligning investment to a key regional need and realizing regional synergies by rewarding and publicizing projects with a regional scope.
- After the first phase of FRIDA, the funding organizations conducted an external evaluation of the programme and analysed the lessons learned. This evaluation assessed the fund's impact in the region and how much the community values the programme, which resulted in the organizations' commitment to a second phase and the launch of the FRIDA awards.

Source: LACNIC annual report 2013; Programa Frida website <http://programafrida.net/>

Box 4: Brazil's strategic development of local production clusters (APLs)

Initiative overview

Brazil's policy for APLs promotes the development and implementation of a coordinated strategy among a region's economic, political and social agents that engage in specific production activities. APLs include businesses from the same production sector and heavy participation by SMEs.

Challenge(s) addressed by the initiative

Cluster-based development strengthens production linkages and improves firm-to-firm coordination, as it allows the stakeholders to deploy resources strategically and engages industry leaders in a regional strategy, thus fostering communication and networking among firms.

Actions taken

Since its inception in 2004, more than 1,000 local production clusters have been identified, which has revealed the challenges of quantitatively tracking and measuring the effectiveness of policies designed for them. To establish a common vision and priorities, the Ministry of Development, Industry and Foreign Trade (MDIC) has held five Brazilian APL conferences to analyse the progress of these plans in collaboration with the institutions in the Permanent Working Group on APLs. In a 2011 conference, participating members identified a set of four strategic priorities, helping to ensure continuity of operations towards a common set of goals.

Role of the stakeholders

Brazil's MDIC supervised the creation of the Permanent Working Group on Local Production Clusters, which involves more than 30 public and private institutions. This group coordinates projects nationwide to support APLs, identifies their needs, and provides responses through the existing support instruments or by creating revitalization projects as part of each APL's strategic development plan prepared by its steering committee.

Outcomes and lessons learned

The design and implementation of the policy for APLs in Brazil illustrates a successful example of a government agency coordinating a long-term vision and strategy, resulting in a continuity of support and implementation by its various stakeholders.

Source: ECLAC Latin American Economic Outlook, 2013

Box 5: Finland's Vigo Venture Accelerator Programme

Initiative overview

Finland's government launched a venture accelerator programme, called Vigo, to coach start-ups to quickly enter the global market with the help of successful entrepreneurs. Its objective is to create a market for start-ups and experienced business people and incentivize them to find each other.

Challenge(s) addressed by the initiative

Finland, despite strong innovation and institutional capacity, has been unsuccessful in introducing new high-growth start-ups to the global market. The biggest challenge to growth was not money, but know-how.

Actions taken

Selected accelerator teams invest their own money in the start-ups they choose and provide coaching, which represents a strong commitment to ensuring the growth of the company. More than 60 start-ups have gone through the Vigo accelerator programme.

Role of the stakeholders

- The Ministry of Employment and the Economy establishes policy guidelines for the programme.
- A ministry-appointed advisory group creates indicators to measure the success of the programme and sets priority actions.
- Accelerator companies are private companies that are run by experienced entrepreneurs. They select their target start-ups and provide coaching and funding.

Outcomes and lessons learned

- During its four-year existence, the Vigo accelerator teams have succeeded in attracting more than €200 million in funding for their target companies, with the number of companies totalling more than 60. One-third of the funding comes from the public sector and the remaining two-thirds from the private sector.
- Channelling government funding, in the form of grants or equities, seems to be much more efficient when it is controlled by experienced Vigo teams. Direct government financing for enterprises tends to be "loose" money without control. Recent studies show that even government R&D financing in the form of grants has no effect on a company's productivity.

Source: World Economic Forum Competitiveness Repository

Effective coordination between the knowledge and production sectors is just as crucial as firm-to-firm coordination, particularly since it has a direct impact on the efficiency of the region's R&D and education investments. Two examples of production linkages are highlighted in the examples below: 1) Netherland's government-led initiative to strengthen the connection between public research institutions and

industries (Box 6) and 2) Switzerland's vocational education and training system, which closely aligns education providers and employers (Box 7).

Box 6: The Netherlands – Leading Technology Institutes

Initiative overview

The Leading Technology Institute (LTI) was launched in 1997 to bring together public research organizations (e.g. universities, national research centres) and industrial partners.

Challenge(s) addressed by the initiative

As the Netherlands' innovation system began showing signs of losing momentum in the 1990s, research highlighted a mismatch between output in terms of new or substantially improved products in sales (at that time well below the EU average) and labour productivity growth and (public) research output (in terms of patents and publications), which pointed to existing inefficiencies. Inadequate interactions between science/higher education and industry were identified as the main weakness of the Dutch Innovation system.

Actions taken

The LTI's primary mission is to conduct strategic research to increase the innovative power and competitive strength of Dutch industry. Partners engage in knowledge dissemination, valorization (IP rights, licensing and product development), and educating and training the workforce (via PhD positions).

Role of the stakeholders

- The public sector launched the initiative and funds up to 50% of its costs.
- The private sector's industrial partners define the research programmes of the LTIs in order to align all research with the needs of the private sector and provide the majority of the funding.

Outcomes and lessons learned

- The most significant outcome has been the incentive for private and public partners to cooperate. Private partners can profit from new knowledge developed by academics, whereas academic partners can better understand how the industry is working.
- LTI initiatives' worldwide citation impact of 2.90 (Wetsus) and 2.04 (Dutch Polymer Institute) in 2011 is well above the worldwide average of 1.0.
- Lessons from the LTI programme include the importance of a good monitoring system with SMART (specific, measurable, attainable, relevant, and time-bound objectives that facilitates the adjustment and fine-tuning of the programme in accordance with its objectives).

Source: World Economic Forum Competitiveness Repository

Box 7: Switzerland's Vocational Education and Training (VET) basic commercial training reform project

Initiative overview

Switzerland's VET commercial training programme is a vocational pathway that annually prepares 30,000 young people to enter the job market in trade- and commerce-related occupations. This three-year training programme combines in-company training and school attendance. The initiative to reform this basic commercial training began at the demand of companies that wanted to better align the programme to their needs.

Challenge(s) addressed by the initiative

Companies that hired graduates of the basic commercial training programme perceived the existing teaching methods as too scholastic, and deemed that students were not being trained according to their professional needs. Companies wanted to be more involved in defining the type of training needed to improve students' employability.

Actions taken

The new training programme has adopted a more competence-oriented approach, which allows apprentices to understand the complexity of the working processes in their companies and encourages business-process thinking as well as the networking approach. The new system applies a digressive school model: during the first two years of their curriculum, students must spend three days in a company and two days in school per week. In the third year, they spend four days a week in a company and one day in school.

Role of the stakeholders

- Financial and managerial responsibility for the overall VET programme and this reform project were jointly shared by the confederation, cantons and professional organizations. During the six-year pilot phase, these partners met several times a year to exchange information, provide updates and introduce any necessary changes.
- The federal administrator of the VET program was in charge of coordinating and managing the basic commercial training reform project. Cantonal and social representatives were also involved in project management, offering advice and assistance during the decision-making process.
- Companies from 23 participating sectors agreed upon performance targets for every learning site and defined the core syllabus, clarifying the objectives for the schools and companies.

Outcomes and lessons learned

The new digressive school model has improved the students' productivity in the workplace, and the standardization of learning sites and the curriculum improved the mobility of apprentices within the

participating sectors. A cost-benefit analysis revealed that while the reform led to a rise in costs for the first two years of training, the overall benefits outweighed the costs. Some of the key lessons learned include the importance of establishing common standards and evaluation processes, and engaging and communicating with all levels of stakeholders throughout the reform process.

Source: OECD/CERI Study of Systemic Innovation in the Swiss Vet System, 2008

Increasing direct coordination among the region's governments and universities is another underexplored opportunity to address the skills and innovation challenges. Two of the region's government-led initiatives to improve Latin American student performance and the quality of research and innovation are discussed below. The Pacific Alliance – a Latin American trade bloc composed of Chile, Colombia, Mexico and Peru – recently launched the Pacific Alliance Student and Academic Mobility Programme (Box 8), designed to train specialized human capital through educational exchanges of undergraduates, doctoral students and professors among the member countries of the Alliance. Brazil's Science without Borders (Box 9) initiative is another student mobility programme designed to enhance Brazil's competitiveness and innovation through the international mobility of undergraduate and graduate students and researchers in the sciences and related fields.

Box 8: Latin America's Pacific Alliance Scholarship Programme

Initiative overview

Launched in 2012, the Pacific Alliance Student and Academic Mobility Scholarship Program enables the Pacific Alliance countries (Chile, Colombia, Mexico and Peru) to encourage student and academic mobility in the region by providing scholarships for academic exchanges for periods ranging from three weeks to 12 months. It is a reciprocal programme that provides 100 scholarships a year for each member country: 75 for undergraduate mobility scholarships and 25 for doctoral and teaching candidates.

Challenge(s) addressed by the initiative

Recognizing the importance of facilitating the mobility of talent to create better conditions for competitiveness and economic development, this student mobility and scholarship programme not only aims to improve the flow of young talent from one country to another, but also to strengthen the quality of research and higher education by facilitating the mobility of teachers and researchers among the countries of the Pacific Alliance.

Actions taken

In two years of operation, a total of 658 scholarships have been awarded to date: 186 for Chile; Colombia, 157; Mexico, 177; and Peru, 138. The scholarships include a monthly stipend, international air transportation and health insurance.

Role of the stakeholders

The governments of the participating countries provide the funding for the scholarships and coordinate the exchange of students, while the universities in the participating countries administer and promote the programme in the application process and select the students in coordination with members of the governments.

Outcomes and lessons learned

The Pacific Alliance Scholarship Program has become a benchmark of excellence for scholarship programmes in Latin America and one of the most important programmes for student and academic mobility on the continent. It is at the forefront of such efforts, and at the level of other Latin American programmes such as Ecuador's Prometheus Program, Brazil's Science without Borders Program and the Mercosur university student programmes.

Source: Mexico's Secretariat of Foreign Affairs Press Release 342, 1 August 2014; alianzapacifico.net/

Box 9: Brazil's Science Without Borders

Initiative overview

Science Without Borders is a large-scale nationwide scholarship programme primarily funded by the Brazilian federal government. It seeks to strengthen and expand the initiatives of science and technology, innovation and competitiveness through the international mobility of undergraduate and graduate students and researchers.

Challenge(s) addressed by the initiative

Science in Brazil has experienced a significant growth in recent years. However, the country still needs to: (a) increase the number of PhDs relative to the population, (b) enhance the interaction between academia and both the business sector and civil society, (c) promote international collaborations in scientific publications, and (d) foster the rate of patent applications made nationally and internationally. Brazilian institutions need to rapidly engage in this process, since several factors still hinder a more international view of the country's scientific research.

Actions taken

Relationships with host institutions have been established in 43 countries. The following countries have received the largest share of Science Without Borders students to date:

- United States (26,300)
- United Kingdom (9,500)
- Canada (7,000)
- France (6,400)
- Germany (5,900)

Role of the stakeholders

- The programme is a joint effort of the Ministry of Education and the Ministry of Science and Technology. The bulk of its \$1.36 billion phase one budget has been supported by public funds, with approximately one-fourth contributed by the private sector.
- Brazilian universities submit their top students for each type of scholarship.
- Interested hosting institutions outside Brazil complete a participation form and obtain information from a partner institution in Brazil.

Outcomes and lessons learned

The programme reached its goal of granting 101,000 scholarships during phase one in September 2014. The second phase begins in 2015, with the goal of supporting a further 100,000 scholarships for study abroad for Brazilian university students.

The new phase will prioritize students who have won awards in national Brazilian maths, physics and chemistry competitions. There will be an added focus on graduate students, in particular programme alumni seeking

graduate scholarships. There is also increased interest in Asia, specifically Korea, China and Japan, and a desire to increase the numbers there.

Sources: <http://monitor.icef.com/2014/07/brazil-extends-science-without-borders-with-100000-new-scholarships/>;
<http://www.cienciasemfronteiras.gov.br/>

Common Success Factors

Several common success factors emerge throughout the examples that also mirror the conditions defined above as “causes behind the causes”. First, a clear vision that drives long-term strategy is a crucial success factor for virtually all of the examples outlined in this section. The desired outcomes were not achieved in a matter of weeks or months – many necessitated fundamental behavioural and/or structural changes that require a long maturation period before the benefits become clear. Although a government organization was the most frequent initiator of these changes, continued engagement by actors from the private and/or civil sectors ensured continuity of vision and translated it into action, from both the financial and strategic perspectives. Second, several of the examples cite the establishment of a quality monitoring and evaluation system as one of the most important lessons learned. There are two common elements of a successful monitoring and evaluation system: 1) all stakeholders contribute to defining the standards by which the performance and outcomes are measured and 2) objectives and standards are fine-tuned and calibrated at regular intervals to ensure continued alignment with the overall vision and strategy. All of these success factors ultimately share a common outcome: the cultivation of trust and alignment among previously disconnected actors.

Conclusion

Public-private collaborations can make significant improvements to the impact of investments, generate positive spillovers and have the potential to positively influence the region’s structural limitations, such as the framework conditions, production-driven weaknesses, and cultural beliefs and practices explored in this paper. These examples demonstrate that the strategic execution of public-private collaborations with a clear vision, strategy and evaluation system can be used to boost Latin America’s productivity and raise its overall competitiveness.

3.5 Conclusion

Latin America’s skills and innovation gaps pose a serious challenge to the region’s productivity, and Latin American leaders must address these gaps to sustain and raise the region’s competitiveness. This paper summarizes the various dimensions of these skills and innovation gaps from the existing literature, and explores the underlying factors and root causes of these gaps. The gap is primarily due to a mismatch between the level and type of skills provided by the region’s education system and the skills needed by the region’s employers. A study of the region’s innovation landscape reveals weaknesses in both the outputs of innovation and the basic capabilities of firms and individuals to generate high-quality innovation.

Many of the observed gaps in skills and innovation were found to share a set of common root causes. Often, a lack of progress in skills and innovation could be attributed not only to underinvestment in key areas such as education and R&D, but also to inefficient and uncoordinated investments among the various stakeholders from private, public and civil organizations. These factors often resulted in poor returns on investment and a misalignment between where the investments are made and where they are needed most for maximum growth and productivity.

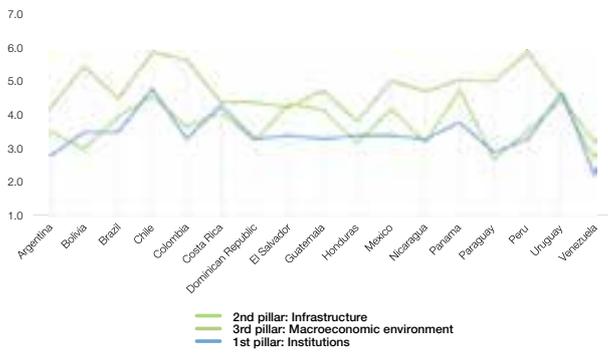
Addressing these challenges of inefficient investment allocation and poor coordination requires stakeholders across sectors to implement strategies under a common set of objectives, and to stay closely aligned by agreeing to a common set of standards and an evaluation system to measure their ongoing progress and success. Examples from both within and outside Latin America were provided to illustrate how such efforts could be structured and implemented. The examples included organizations that are effectively leveraging public-private collaborations to tackle their skills and innovation challenges.

These examples highlight the need to adopt a number of measures that will require a common vision and the shared commitment of all stakeholders represented in the Competitiveness Lab – Latin America. Given the urgency with which action must be taken, the analysis and examples in this document will serve as the foundation upon which to develop a set of recommendations for further collaboration and action across the region, to identify the most effective and efficient actions to help the region escape its cycle of negative productivity.

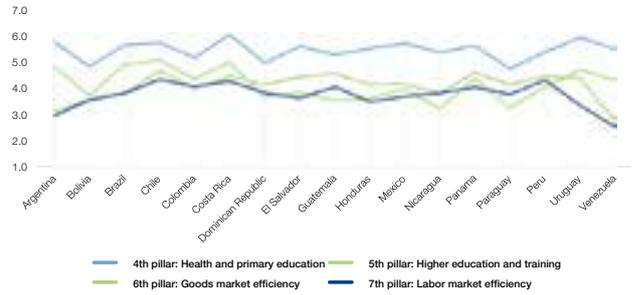
3.6 Appendix

Latin American Scores on the 12 Pillars of Competitiveness, by Country

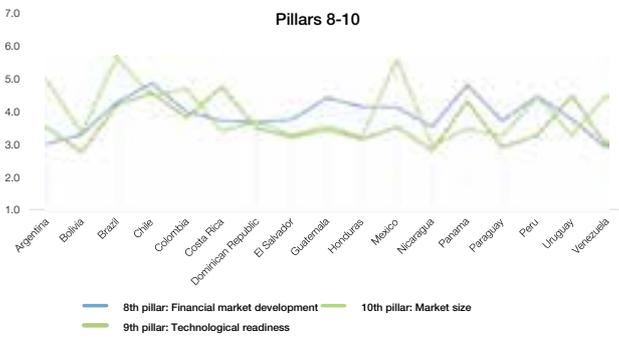
Pillars 1-3



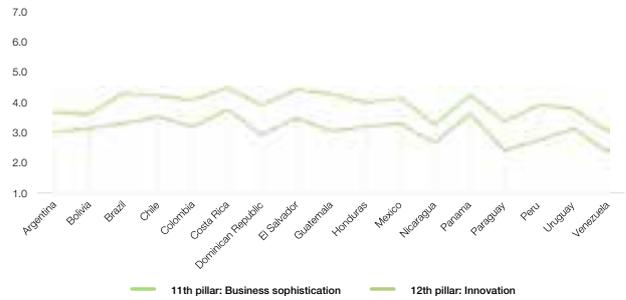
Pillars 4-7



Pillars 8-10



Pillars 11-12



Source: World Economic Forum, *The Global Competitiveness Index 2014-2015* (2014).

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Notes

¹ The World Economic Forum's Competitiveness Repository is an initiative to provide a platform of best practices, showcasing examples of successful competitiveness programmes that rely on private-public cooperation.

² Casanova et al., 2011

³ C. Arruda, Venture Capital, 2012

⁴ Arboleda, Deloitte, 2014

⁵ World Economic Forum Competitiveness Repository has further details on the KPlus Programme

⁶ Interview with Jose Ramon Perea of OECD

⁷ Hands-on training, as reported by students, is the most effective way for students to obtain applicable skills, yet this type of training is not widely available in Latin America (McKinsey survey of workplace skill gaps).

⁸ An overview of the FRIDA fund is available in Section 3.4.

⁹ World Economic Forum Competitiveness Repository has further details on the EIP Programme

¹⁰ See summaries of both initiatives in the Annex Section 3.4 in the online version of this report at <http://wef.ch/latamcompetitiveness>

¹¹ OECD/CAF/ECLAC, 2014.

¹² Talvi and Munyo, 2013

¹³ World Bank Global Economic Monitor (GEM) Commodities [http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=global-economic-monitor-\(gem\)-commodities](http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=global-economic-monitor-(gem)-commodities)

¹⁴ World Economic Forum GCR, 2014

¹⁵ Powell, 2014

¹⁶ See the Appendix for individual country scores by pillar.

¹⁷ McKinsey's education to employment report surveyed nine countries, two of which (Brazil and Mexico) represent Latin America's current state. See Mourshed, Farrell and Barton, 2012

¹⁸ OECD/CAF/ECLAC, 2013

¹⁹ Bassi et al., 2012; Manpower Group, 2013; World Bank, 2012; WEF, 2014

²⁰ Deloitte Human Capital Trends Report, 2014

²¹ Deloitte Consulting LLP and Bersin by Deloitte, 2014

²² Bassi et al., 2012; OECD/CAF/ECLAC 2013

²³ IADB, 2012

²⁴ OECD/CAF/ECLAC, 2013

²⁵ OECD/CAF/ECLAC, 2013

²⁶ WEF GCR, 2014

²⁷ Aedo and Walker, 2012

²⁸ OECD/CAF/ECLAC, 2013

²⁹ Tinoco, 2014

³⁰ United Nations, 2014; Ñopo, 2012

³¹ Mourshed, Farrell and Barton, 2012

³² United Nations Conference on Trade and Development (UNCTD) data from Merchandise trade matrix - product groups, exports in thousands of dollars, annual, 1995-2013. <http://unctadstat.unctad.org/wds/TableView/tableView.aspx?ReportId=24739>

³³ Casanova et al., 2011

³⁴ Global Innovation Index, 2014

³⁵ Casanova et al., 2014. *Maquila* is a manufacturing operation in a free trade zone (FTZ) in Mexico, where factories import material and equipment on a duty-free and tariff-free basis for assembly, processing, or manufacturing and then export the assembled, processed and/or manufactured products, sometimes back to the raw materials' country of origin

³⁶ Disruptive innovation, a term coined by Clayton Christensen, describes a process by which a product or service takes root initially in simple applications at the bottom of a market and then rapidly moves upmarket, eventually displacing established competitors. See <http://www.claytonchristensen.com/key-concepts/>.

³⁷ Bloom et al., World Management Survey, 2012

³⁸ Crespi, Fernández-Arias and Stein Chapter 5, 2014

³⁹ Global Innovation Index indicator 5.1.1, 2014

⁴⁰ OECD/CAF/ECLAC, 2013

⁴¹ Ernesto Amoros and Bosma, 2013

⁴² Ernesto Amoros and Bosma, 2013

⁴³ OECD, 2010, Casanova et al., 2011

⁴⁴ World Bank database <http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS>

⁴⁵ The top five nations are Switzerland, United Kingdom, Israel, United States and Belgium.

⁴⁶ World Economic Forum CGR, 2014

⁴⁷ As found by Giuliani and Bell studying a wine cluster in Chile, 2005

⁴⁸ Lederman and Messina, 2014

⁴⁹ Lederman and Messina, 2014

⁵⁰ OECD/CAF/ECLAC 2012

⁵¹ Competitiveness Lab Steering Board meeting notes, Panama City, April 2014.

⁵² Crespi, Fernández-Arias and Stein, chapter 5, 2014

⁵³ World Economic Forum, 2013

⁵⁴ OECD, 2014

⁵⁵ ECLAC, 2011

⁵⁶ Competitiveness Lab Steering Board Notes.

⁵⁷ Competitiveness Lab Steering Board Notes.

⁵⁸ Illustrated in Figure 14

⁵⁹ OECD, 2013

⁶⁰ OECD, 2013

⁶¹ ECLAC, 2011

⁶² OECD/CAF/ECLAC, 2013

⁶³ OECD, 2014; OECD/CAF/ECLAC, 2012; Lederman and Messina, 2014

⁶⁴ Lederman and Messina, 2014

⁶⁵ Crespi, Fernández-Arias and Stein, chapter 5. 2014

⁶⁶ Brookings panel discussion on innovative entrepreneurship transcript, 16 June 2014.

⁶⁷ OECD/CAF/ECLAC 2014.



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